Vol. XX. Part 11.

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The Journal of the Department of Agriculture of Victoria, Australia.

November, 1922.

PRINCIPAL CONTENTS

Dairy Farming

Some Wine Defects

Weeds and Their Eradication

Stock Improvement

Milk Fever

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OF

THE DEPARTMENT OF AGRICULTURE,

VICTORIA, AUSTRALIA.

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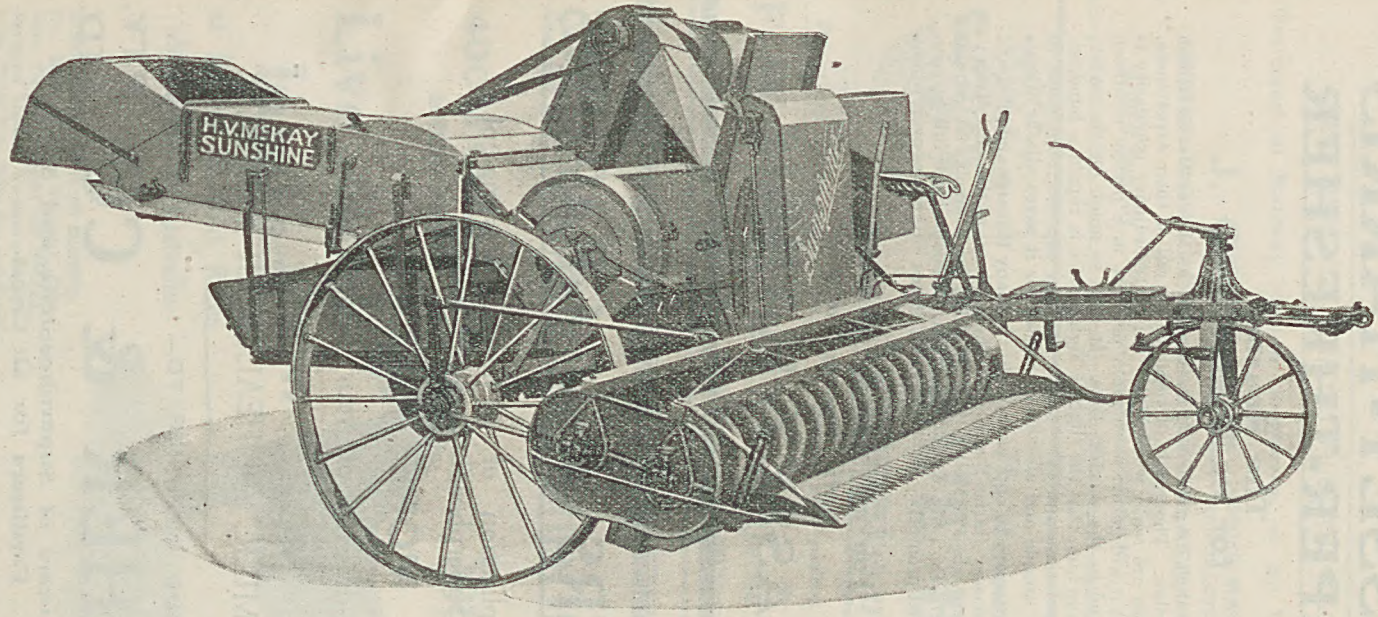

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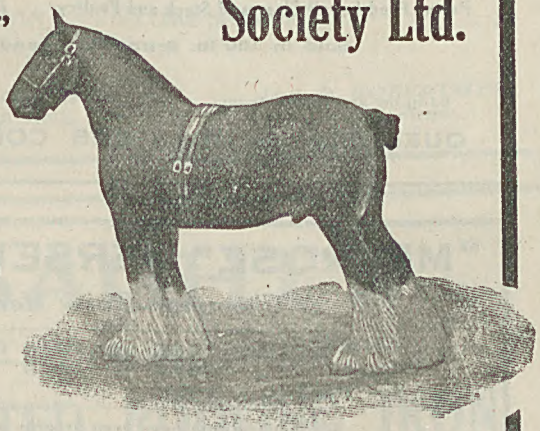

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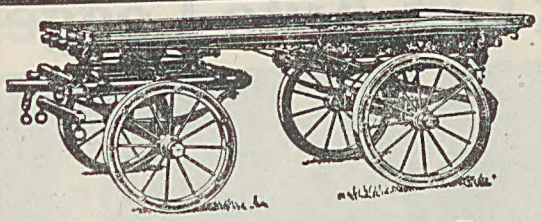

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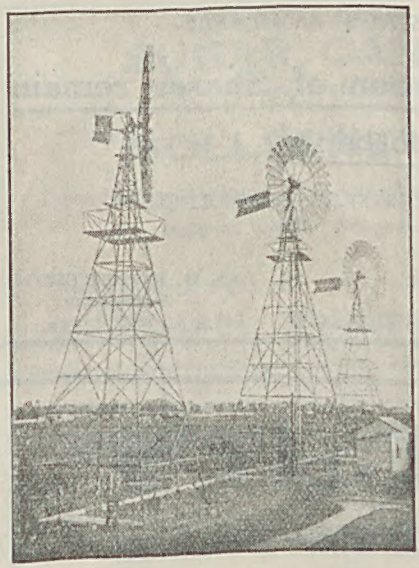

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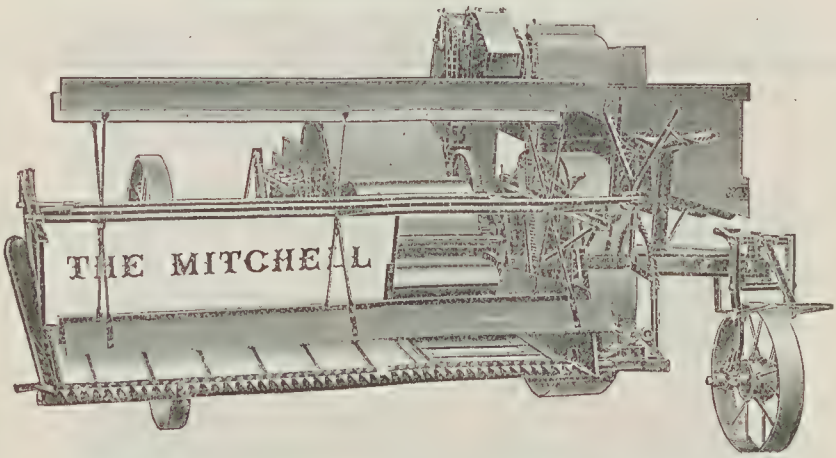

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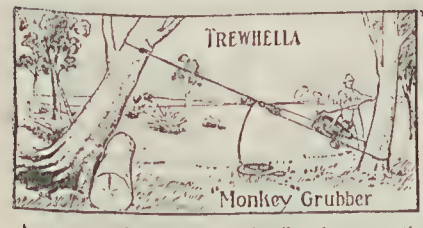

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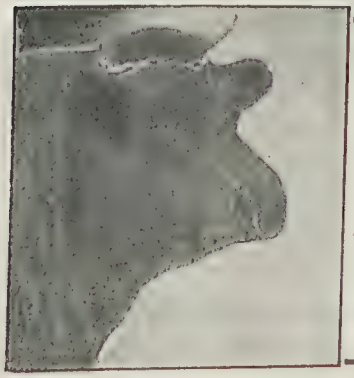

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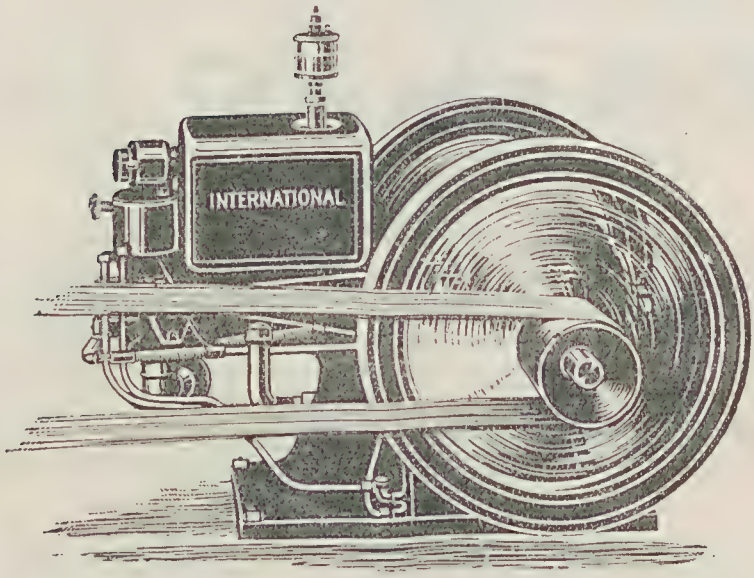

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OF THE

Department of Agriculture

OF

VICTORIA.

Vol. XX. November, 1922. Part 11.

DAIRY FARMING.

By R. T. Archer, Senior Dairy Inspector.

A dairy farmer should always, as far as possible, breed and rear his own calves, paying the greatest attention to the selection of calves from the best butter-producing cows as ascertained by the scales and Babcock test. Just as great care should be given to selecting a bull calf as in the choice of heifers. It is no use rearing bulls from cows that are not good producers.

By rearing one's own stock the improvement of the herd will be surer and more rapid than would otherwise be the case. There is also less liability of introducing such diseases as contagious abortion, tuberculosis, pleura-pneumonia, contagious mammitis, &c., which are the cause of so much loss whenever they develop.

A certain percentage must be culled from a herd every year owing to accident, disease, age; or because their small returns make them unprofitable to keep. The number of rejects in any year will probably amount to one-third or one-fourth of the total number of the herd.

Care of Cow during Pregnancy.

The dam should be properly nourished during the period of pregnancy, whether she is in milk or dry, so that her calf will be well developed when born. A careful record should be kept of the date of service, so that it will be known when the cow is due to calve, and that she may be kept under observation. As the time approaches the udder will develop and milk will be formed. The vulva will become enlarged, soft, and to some extent inflamed, and the muscles and cartilage on each side of the tail become very much relaxed.

Difficulty in Calving.

When the cow is about to calve she should not be interfered with too soon, but nature should be allowed to take its course, and in nine

out of ten cases there will be no need for interference. The tenth case, however, may be a very valuable cow, and if it is seen that she cannot calve without assistance this should be given.

If the calf is coming normally it will be with the two front feet first, and the head resting between them straight and with the nose following the fore feet. Occasionally, especially in a heifer giving birth to her first calf, the passage will be so small that assistance will be necessary. In this case take hold of the fore-legs and pull gently when the animal labours. In case of the hind legs coming first, if the legs are pointing towards the udder, the calf may be taken away as in a normal presentation, without any ill-effects.

If the calf be twisted, *i.e.*, head turned back, or else a breach presentation with legs under the body, &c., it must be pushed back and turned. Sometimes this is a matter of some difficulty, and it may be necessary to get a pulley block, and with a rope attached to the cow's hind legs, hoist her up until the weight of the calf is thrown forward. This will make it easy to get the hand in and turn it. In such a case it is advisable to obtain the services of a veterinary officer.

Before inserting the hand it should be smeared with carbolic oil (1 to 20), in which a little laudanum is mixed. The cow should be raised immediately after calving to prevent straining.

Calf Rearing.

Care of the Young Calf.

As soon as the calf is born, care must be taken to remove any membrane from the head to allow it to breathe. If the cow is allowed, she will lick the calf dry, but if it be taken away immediately, it should be rubbed dry with clean straw and kept warm.

A wise precaution against contagious diarrhœa is to tie the navel and dress it with iodine immediately the calf is dropped. Although this disease is not common in Victoria, in a few places it has been the cause of very heavy loss, and in the older countries it is a disease widely spread.

The calf should have its mother's biestings or colostrum for the first five days. About a pint and a half should be fed to it three times a day. The biestings act medicinally and clean out the bowels. Should it happen that the cow's biestings are not available, the calf should be given from one to two ounces (according to size) of castor oil in a little milk—to be repeated, if found necessary.

The Growing Calf.

After the fifth day new milk may be substituted for biestings. When calves are a week or ten days old, it is a good plan to put a little dry meal into their mouths immediately after feeding. This will divert them from sucking the ears of their mates. After a little while they will learn to take the meal out of a trough.

When calves are a fortnight old half-a-pint of skim milk may be added to each feed, and instead of three times they may be fed only twice per day. At a month old they may be fed entirely on skim milk, and, if possible, some lucerne or clover. If lucerne or clover is not available

then give some fine hay, or bran and good sweet chaff, or crushed oats. If they can be given some good grass, so much the better.

A good grain mixture is: Maize meal, 3 parts; ground oats, 3 parts; wheat bran, 1 lb.; linseed oil meal, 1 lb.

The following mixture is used almost throughout Ireland, and is recommended by the Department of Agriculture there:—

Two parts, by weight, maize meal.
Two parts, by weight, oat meal.
One part, by weight, linseed meal.

All finely ground.

Mix with sufficient boiling water to make a thick gruel, bring to the boil, and allow to stand for twelve hours before being fed with skim milk. Feed ¼ lb. per head daily, increasing to ½ lb. or more as found necessary.

Ground millet has been found quite suitable for feeding young calves, and may be fed 1 lb. per head for the whole rearing period of seventeen weeks. At the Woburn Experiment Farm in England separated milk is fed to calves and crushed oats are given dry.

Cod liver oil (5s. 6d. per gallon) has been found an excellent substitute for butter fat in feeding skim milk to calves. It is known that it contains vitamines which are essential for the growth of young animals and not contained in vegetable oils. The following will be found a good guide for the use of cod liver oil:—

—	Whole Milk.	Separated Milk.	Cod Liver Oil.	Meal.
First 2 weeks	6 to 8 pints			
3rd week	6 pints ..	3 pints ..	..	2 oz. daily
4th week	3 pints ..	6 pints ..	..	4 oz. daily
5th week	..	8 pints ..	1 fluid oz.	4 oz. daily
6th week	..	8 pints ..	2 fluid oz.	6 oz. daily
7th week	..	8 pints ..	2½ fluid oz.	6 oz. daily
8th week	..	8 pints ..	3 fluid oz.	6 oz. daily
9th week	..	8 pints ..	3 fluid oz.	4 oz. daily

The oil should be measured in fluid ounces (an ounce is two tablespoonfuls) into the bucket, the milk poured on to it and well stirred. In this way it mixes well with the milk. The meal may be measured out in the same way.

Meal fed dry gives just as good results as if made into gruel.

The following is a good guide to feeding the young calf:—

At 8 weeks old, 10 lbs. skim milk daily.
At 9 weeks old, 12 lbs. skim milk daily.
At 10 weeks old, 14 lbs. skim milk daily.
At 12 weeks old, 16 lbs. skim milk daily.
At 14 weeks old, 16 lbs. skim milk daily.
At 16 to 24 weeks old, 18 lbs. skim milk daily.

In addition, they should be given as much grain or hay as they will clean up.

Sunlight, fresh air, and exercise are essential to the healthy growth of young calves. Valuable stud animals should, when practicable, be groomed.

Three Essential Rules.

Three rules which must be observed in rearing calves are:—

1. *Do not overfeed.* Better give too little than too much. If the stomach is overloaded with milk the milk will coagulate and hard lumps of curd, which cannot be digested, will be formed. This sets up an irritation which cause white scour (quite distinct from the contagious form), and if not checked develops into dysentery, from which the calf dies.

2. *Observe cleanliness.* This is particularly necessary in the case of feeding utensils. There are more calves killed in this country through being fed with dirty milk in dirty utensils than from any other cause. The best way to manage the feeding of calves is to provide small bails with a separate bucket for each. Half kerosene tins will do, but 2-gallon buckets will be more convenient, as they will slip into one another, and so be convenient for handling and cleaning. These tins should be washed every day. If troughs are used, they should be of metal, so that they can be properly cleaned, and the calves must be closely watched to prevent over-feeding. The bail system may appear extravagant and laborious, but it has been adopted successfully by many large dairy farmers.

The temperature of the feed should be as near that of the body as possible, *i.e.*, 101 deg. Fahr. If too cold the system gets a chill, and the digestive organs become deranged.

Whey for Calves.

Owing to its watery appearance, many farmers conclude that whey is of very little value as a food for calves. However, it is worth just half as much per gallon as separator milk. It contains about 5 per cent. sugar, ¾ of 1 per cent. albumen, and ¾ of 1 per cent. ash, chiefly phosphate of lime. The casein and fat have been converted into cheese, therefore, the casein, which is the flesh-forming constituent, must be replaced by something else. Linseed cake meal is one of the most satisfactory foods for this purpose, being rich in protein and containing also a good percentage of fat. There is no doubt cod liver oil may be added with good effect, as it contains a vitamine which will be a good substitute for that removed in the butter fat.

The reason many do not have satisfactory results when feeding whey is due to the want of sufficient care. If possible, it should be fed quite fresh from the curd, but when it is necessary to keep it for some time, as in the case of a cheese factory, when the whey is a day old, it must be scalded as soon as it is run off the curd. This insures its being delivered in a wholesome condition. The scalding may be done by running all the whey into a vat or tank and turning steam direct into it and heating it up to over 150 deg. Fahr. When feeding whey to calves mix linseed meal with it and feed at body temperature. As in the case when skim milk is fed to calves, other foods, such as hay, meal, grass, &c., should also be given.

It may be mentioned that some of the best cattle in the State are reared on whey.

Mixtures, etc., for Growing Stock.

Linseed cake meal is found to give excellent results whether fed with milk, whey, or alone. The linseed should be boiled or scalded to destroy the ensymes natural to it, otherwise it may set up chemical action detrimental to the calf. If fed dry this is not necessary.

With pure linseed (either whole or ground) 1 lb. may be used to 1 gallon of water. Stir until all froth disappears and the mixture is perfectly smooth, no lumps remaining.

A little wheat flour counteracts laxative effect of linseed; maize meal or oatmeal will encourage it.

Half a pint of lime water daily per calf in the food is a valuable addition.

Hay Tea.

This is made by steeping hay in a copper of water and then boiling for one to two hours until 12 lbs. of hay produces 100 lbs. of tea. The tea is then fed in quantities similar to separated milk; ¾ lb. of linseed meal may be made into a jelly and fed along with the hay tea. Dry hay, meal, grain, &c., should be given as usual.

Linseed Jelly.

To prepare linseed jelly, add 1 pint of seed to 1 gallon of boiling water and keep simmering from three or four hours.

Lime Water.

Lime water is made by putting some quick-lime into a tub and filling it with water. After settling, the clear water will contain lime in solution. As it is used up fill the tub again, and repeat this as any lime remains soluble. To test this, breathe into a glass of the liquid through a straw or tube, and if the water becomes milky there is still soluble lime. If it remains clear, empty out the residue and put in fresh lime. A tinned vessel should not be used for lime.

At Six Months Old.

At six months old milk may be stopped (although, of course, it is always a good food), and the calves turned out to pasture, the heifers being kept apart from the bulls.

Always treat calves so that they will be kept growing all the time, although they do not require to be fat, except the beef breeds, such as the Shorthorn, Hereford, and Polled Angus. The dairy cow must have plenty of depth of body to be able to give satisfactory returns, plenty of constitution, and capacity for converting a large amount of fodder into milk of good quality. To this end the calf must be kept growing.

All changes in feeding should be made gradually. Sudden changes in feed, &c., are likely to be harmful.

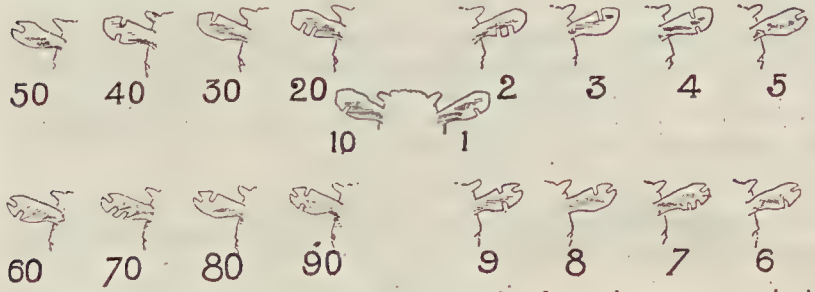
When calves are six months' old they may be given up to 3 lbs. each daily of mixed calf feed; also lucerne, clover, or meadow hay. The leaves of lucerne is especially good for calves.

Cost of Rearing Calves.

	£	s.	d.
Six months' skim milk, 1 gallon per day, at 2d. per gallon	1	10	0
Grass, twelve months, at 9d. per week	1	19	0
Grass, nine months, at 1s. 3d. per week	2	8	9
Labour	0	10	0
Hay, chaff, grain, &c.	0	10	0
	6	17	9

Ear-Marking.

The following will be found a very useful and convenient system of marking calves for future recognition. If marked as soon as dropped, and a record made in the stock-book, there will be no difficulty in tracing the calf afterwards:—



In the illustration the notches appear somewhat large, but a quarter-inch punch will not disfigure the ear.

For marking stud or show animals, tatooing a number on the inside of the ear is the best.

Dehorning, etc.

Calves should be dehorned, except those required for show or stud purposes. The best time to dehorn is before the calf is five days' old. Clip the hair from about the base of the horns, slightly moisten the end of a stick of caustic potash, and rub the tip of each horn for about a quarter of a minute. This should be done from two to four times, at intervals of five minutes. If a little blood shows at the centre of the horn, very slight further rubbing will be necessary. Care should also be taken to rub the centre of the horn, and not the sides, and not to have the stick of caustic potash too moist, for if it runs on to the skin a troublesome sore will result. A piece of brown paper should be wrapped round the caustic to protect the fingers.

Bull calves should be castrated when about one month old. If much older, the animal receives more of a check by the operation.

Calf Ailments.

Scours, or Diarrhœa.

These are due to indigestion. On the first appearance of scours stop the feed and give a dose of castor oil (1 to 2 ounces) in a little milk (half pint or so). Then gradually get the animal on to its feed again.

Hoose, or Lung Worm.

If calves have to run on damp ground, they should be provided with a warm, dry shed, and the ground should, as soon as circumstances permit, be thoroughly drained, otherwise they may be affected with hoose, or worm in the throat. If attacked by this complaint, they appear to be in bad health, exhibit a dirty, staring, hard, dry appearance of the coat, and they have a cough, with discharge of mucus. When the mucus is examined under a microscope, embryo worms may be found in it. If a calf which has died from this complaint is opened, a ball of fine worms will often be found in the bottom of the wind-pipe.

Affected calves must be kept dry, warm, and well fed, and given from half an ounce to one ounce of turpentine soaked into dry meal and then mixed with cold gruel. When given in this way the risk of choking from turpentine is reduced to a minimum. The dose may be repeated once or twice after an interval of a few days.

Ringworm.

Young cattle, if in poor condition, are often troubled with ringworm. White scaly patches, without hair (most abundant about the head and neck), caused by a vegetable parasite, appear. These may be destroyed by applying red mercurial blistering ointment, made by mixing one part of biniodide of mercury with sixteen parts of lard, this being half the strength of the blister; if more convenient, carbolic acid may be used instead. The parts should be prepared by scraping off the scales or washing them with kerosene a few days previous to applying the dressing.

Lice.

If cattle, young or old, are allowed to become too poor, or fed for a time on insufficient nutritious food, as barley straw, they are liable to become infested with lice, mostly about the head, neck, and withers, These may be best destroyed by dressing with phenyle or other carbolic preparation. Care should be exercised when applying any wash of a poisonous nature, as serious loss sometimes results through the animal licking its skin.

Blackleg.

The greatest scourge of young cattle is "blackleg," or, as it is sometimes called, "symptomatic anthrax." This complaint most frequently attacks cattle of from about three months to two years old, generally the finest and best conditioned calves about the time of weaning. The symptoms are harsh, dry appearance of the coat, loss of appetite, sometimes stiffness in one leg, accompanied by swelling. The animal invariably dies in 24 or 48 hours. Generally there is a frothy mucous discharge from the nose, tinged with blood. If the fingers are rubbed over the skin a crepitation is apparent like the crinkling of paper, due to the formation of gas beneath the skin. If the swollen part be opened it will generally be found to consist of a yellowish, jellylike, watery tumour. Where mortality occurs from this complaint the whole of the carcasses should be completely destroyed by fire. There is no cure, and the only course open is prevention by inoculation by "blacklegine," which can be obtained from the veterinary surgeon, with instructions how to apply it. If the complaint makes its appearance, all the young cattle should be inoculated.

Gestation Calender (*Woll*).

Average Gestation Period.

Mares .. 48½ weeks (340 days, extremes 307 and 412 days).
Cows .. 40½ weeks (283 days, extremes 240 and 311 days).
Ewes .. 22 weeks (150 days, extremes 146 and 157 days).
Sows .. 16 weeks (112 days, extremes 109 and 143 days).

Time of Service.	Mares, 340 days.	Cows, 283 days.	Ewes, 150 days.	Sows, 112 days.
Jan. 1	Dec. 6	Oct. 10	May 30	April 22
6	11	15	June 4	27
11	16	20	9	May 2
16	21	25	14	7
21	26	30	19	12
26	31	Nov. 4	24	17
31	Jan. 5	9	29	22
Feb. 5	10	14	July 4	27
10	15	19	9	June 1
15	20	24	14	6
20	25	29	19	11
25	30	Dec. 4	24	16
Mar. 2	Feb. 4	9	29	21
7	9	14	Aug. 3	26
12	14	19	8	July 1
17	19	24	13	6
22	24	29	18	11
27	Mar. 1	Jan. 3	23	16
April 1	6	8	28	21
6	11	13	Sep. 2	26
11	16	18	7	31
16	21	23	12	Aug. 5
21	26	28	17	10
26	31	Feb. 2	22	15
May 1	April 5	7	27	20
6	10	12	Oct. 2	25
11	15	17	7	30
16	20	22	12	Sep. 4
21	25	27	17	9
26	30	Mar. 4	22	14
31	May 5	9	27	19
June 5	10	14	Nov. 1	24
10	15	19	6	29
15	20	24	11	Oct. 4
20	25	29	16	9
25	30	April 3	21	14
30	June 4	8	26	19
July 5	9	13	Dec. 1	24
10	14	18	6	29
15	19	23	11	Nov. 3
20	24	28	16	8
25	29	May 3	21	13
30	July 4	8	26	18
Aug. 4	9	13	31	23
9	14	18	Jan. 5	28
14	19	23	10	Dec. 3
19	24	28	15	8
24	29	June 2	20	13
29	Aug. 3	7	25	18

AVERAGE GESTATION PERIOD—*continued.*

Time of Service.	Mares, 340 days.	Cows, 283 days.	Ewes, 150 days.	Sows, 112 days.
Sep. 3	Aug. 8	June 12	Jan. 30	Dec. 23
8	13	17	Feb. 4	28
13	18	22	9	Jan. 2
18	23	27	14	7
23	28	July 2	19	12
28	Sep. 2	7	24	17
Oct. 3	7	12	Mar. 1	22
8	12	17	6	7
13	17	22	11	Feb. 1
18	22	27	16	6
23	27	Aug. 1	21	11
28	Oct. 2	6	26	16
Nov. 2	7	11	31	21
7	12	16	April 5	26
12	17	21	10	Mar. 3
17	22	26	15	8
22	27	31	20	13
27	Nov. 1	Sep. 5	25	18
Dec. 2	6	10	30	23
7	11	15	May 5	28
12	16	20	10	April 2
17	21	25	15	7
22	26	30	20	12
27	Dec. 1	Oct. 5	25	17
31	5	9	29	21

Age at which to Breed.

It is all important that heifers shall be well developed. For this reason they should not be used for breeding too early. For Jerseys, Ayrshires, and other medium-sized breeds eighteen months old will be quite young enough. They will then be two years and three months old when they come in.

Many breeders are obsessed with the idea that heifers must be starved in rearing and then put to the bull at twelve months old to keep them fine, but the experience gained under the Standard Herd Test has already convinced some that this is an unwise policy and that they must have a well-developed animal if the returns in milk and butter are to be satisfactory. In case of the larger breeds, they may well go to twenty-one months old before being bred.

Time to Breed.

The aim should be for a cow to have a calf every year. She comes in season three weeks after calving, and every three weeks thereafter. She should not be served until nine weeks after calving. This, of course, may have to be varied according to circumstances. For instance, it is found that cows calving in early autumn give the best results. They must be provided with plenty of feed during winter, for which they will return a good profit. They will flush again with the spring growth and be dry during the driest months of summer. Again, it is not always possible to get them in calf just when you wish.

and they may then run over too long one year and have to be shortened another to get them back to the right time. Of course, cows required in bloom for a show should be served so that they will calve about the date of the show.

A cow should never be allowed to get low in condition during winter, as it takes two or three months for her to recover before she can give satisfactory returns. What should be going into the bucket is put on to her frame until she recovers normal conditions.

Care at Time of Calving.

As a heifer nears the time of calving, the udder develops and often becomes very highly inflamed and swollen, the swelling frequently extending half way along the belly in front of the udder. Farmers who have not had much experience are frequently alarmed at this. However, there is no necessity for concern, as it is a natural condition.

After the heifer has calved, she should have the udder thoroughly but gently rubbed at each milking, using camphorated oil for a lubricant. The rubbing increases the circulation and so relieves the congestion. Older animals are not troubled in the same way.

When a cow calves normally and at full time, she rarely has any trouble cleaning, as the placenta (afterbirth) comes away naturally within an hour or two after the birth of the calf. Sometimes this is not the case, however, especially in case of abortion, when ½ oz. to 1 oz. of liquid extract of ergot may be given in warm gruel.

A stimulant will also generally produce the desired result. The following has been found highly successful:—A bottle of Burgundy wine, and half a pound of brown sugar, given as a drench, repeated in five or six hours if the first dose is not successful.

As previously mentioned, during the period of pregnancy, the animal should be well nourished to enable her to develop the fœtus properly and to prepare her for the coming lactation. It is found that unless a cow is in good condition when she calves, she will not do so well as she should. If she is in very poor condition, her test will be lower than it should be; and she will not give the quality of milk she is capable of yielding until she is in normal condition.

Milk fever must be guarded against, and although this complaint has, to a very large extent, lost its terrors, prevention is better than cure. When milk fever attacks the animal, it is generally within twenty-four hours after calving, but it may attack her days or even weeks before or after. There is not so much danger with a cow that has been properly fed throughout the year as in one that has been in low condition but latterly has been on good feed and is rapidly thriving. In such a case a cow should be given a dose of salts a week or so before she calves, and should be put on short feed. The dose should be composed of 1 lb. of Epsom salts, ½ oz. of ground ginger, ½ lb. treacle, the three parts to be mixed in warm water or gruel. The mixture just given is a standard dose, and should always be given to a cow or bull on any indication of ill-health.

As soon as the cow has calved, the udder must be attended to. If the calf has sucked, it will not require feeding for the present. If not, milk the cow out dry; some of this first milk, or colostrum or biestings, is necessary for the calf. For about five days the milk will not be free

from some of this biestings, and therefore will not be fit for use for any purpose but feeding calves. It contains a high percentage of protein, and so is highly nourishing. After about five days the milk may be included in the bulk, wheither it be for city supply, or butter or cheese making.

Milking.

This should be done at regular times, and as nearly as possible at regular intervals. The cows will do better, give more milk which will not vary so much in quality as when the intervals are irregular.

To be successful, the dairyman must ever bear in mind that his motto must be "Clean and Cool," and the instructions for subsequent operations will bear this out.

"Cleanliness is next to Godliness" applies to the dairying operations, if possible, more than to anything else.

The provisions of the Milk and Dairy Supervision Act are such that the buildings, yards, &c., must be so arranged that the surroundings may be kept clean and sanitary. The need for this will be explained later. Suffice it now to say that the yards, sheds, &c., must be kept clean. Manure must be regularly cleared away, so that wind cannot blow clouds of manure dust about to settle in the milk utensils.

The cow's udder should always be cleaned before milking. To facilitate this, long hair must be clipped off. The udder must be washed with clean water. A convenient arrangement for this is an old oil drum with a tap, or better still, where it is possible to have water laid on, to have taps in convenient places to rinse the cloth out. This insures clean cloths to wash the udders with. Sometimes we see a ½-gallon billy with water that has served to wash a dozen or more cows. The consequence is that more dirt is being put on than taken off.

Having washed the udder, draw a little milk from each teat on to the palm of the hand to see if there are any clots. Should there be any clot, it is an indication of mammitis, which must be immediately attended to. If there be no indication of any trouble, take the milk away as quickly as possible.

Should a cow be "tough," take the end of the teat between the palms of the hands and rub gently for a moment, this eases the sphincter muscle at the end of the teat. Milk full-handed when possible, and squeeze well, otherwise an easy cow will become tough. Short-teated cows that have to be milked with the finger and thumb are a nuisance, and, no matter how good, a bull from such a cow should never be used. Having got all the milk that can be drawn by using both hands, it is necessary to milk with one hand while the quarter is squeezed and manipulated with the other, so as to work out the strippings from pockets and interstices that exist. In some cows, quite a lot of milk is retained and has to be removed in this way. It must be remembered that the strippings are practically cream, and greatly improve the test. Besides, if the cow be not milked dry, she will tend to gradually dry off.

Cows should be milked twice daily until they are within two months of calving, when they may be milked once daily (unless giving a big quantity of milk) for a while, then every second day, and later twice a week until dry.

Care must be taken to have the udder quite clear before turning out, especially in summer time, or the loss of a quarter may be the result.

A heifer in her first lactation period should be kept milking, even if she is only stripping, until within six or eight weeks of calving again.

Secretion of Milk.

How does a cow produce milk? To fully understand the care and management of the dairy cow we must know something of the physiological process by which she converts the food she eats into milk. We see elsewhere that the food is composed of soluble or digestible and indigestible constituents. The soluble ingredients are composed of—

(*a*) Protein, which is the flesh forming part of the food, from which the whole of the cell system of the body is manufactured and built up.

(*b*) Carbo-hydrates which form the heat and energy necessary for the cow to carry out her function in life.

(*c*) Fat or oil which is also used principally for heat and energy production.

When the cow takes food into her stomach, it is masticated or ground up and mixed with digestive juices secreted by the glands and cells of the stomach and intestines. The soluble part of the food is dissolved, absorbed into the blood, and conveyed to the different parts of the body for its nourishment.

The body of the animal is composed of a mass of cells. These cells are so small that they can be seen only under a microscope. They are like soft-shelled eggs, consisting of an envelope containing albumin, or protoplasm as it is called. This albumin is the life principle of the animal, and has the power of absorbing from the blood the different constituents it requires for its nourishment. For instance, the cells of the bone absorb phosphate of lime and nitrogen from which the bone is manufactured. When a calf is born there is practically no bone in its body. What serves for bone is gristle or cartilage. The cells of the muscle absorb what is necessary for the making of muscle, and the cells of the udder absorb what is required for the manufacture of milk.

Every one knows that the large veins running from the udder along the belly and disappearing about half-way along, are called milk veins, and even now many people think that they convey milk from the stomach to the udder. Large milk veins are certainly an indication of a cow's capacity to give a heavy yield of milk, because they convey a large amount of blood from the udder back to the heart, whence it is pumped to the various organs to be purified of the refuse picked up in its passage through the udder. Large milk veins indicate a large arterial system laden with fresh food juices from which the cells of the udder manufacture milk.

The udder consists of four quarters, with a partition from front to back, completely separating the two quarters on the left side from those on the right. There is not the same definite division between the front and hind quarters on each side. One quarter of the udder can, perhaps, be compared to a bunch of grapes. A bunch of grapes is held to the vine by the main stalk. This may be compared to the teat. The main stalk branches off into smaller stalks, these again into smaller stalks at the end of which is the grape. The teat of the cow's udder branches off into branches or tubes or ducts as they are

called. These branch off into smaller ducts, and so on until they terminate into grape-like bodies lined with cells, which absorb from the blood what is essential to the making of milk.

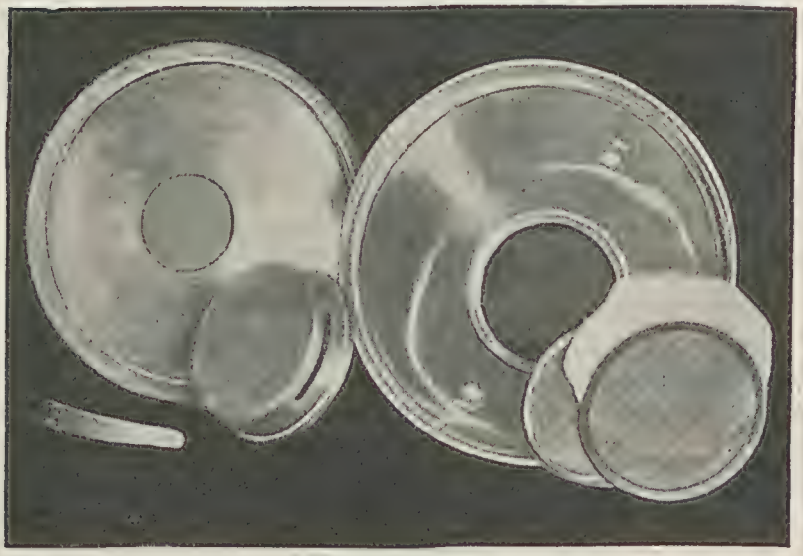
In a bunch of grapes there are spaces between the individual berries, but in the udder these spaces are filled with elastic and connective tissue which expand and contract as occasion requires, and hold the udder in shape and position. In a good class of udder the connective tissue is reduced to a minimum; thus when a cow is milked out dry the udder is like an empty glove or squeezed out sponge. The cow then goes out to feed, and gradually the udder fills up until milking time arrives again, when the udder is again full, but not of milk. If the udder of a cow in full milk were cut open, there would be revealed a cavity holding about half a pint of milk at the top of each teat; the rest of the udder would be shown to consist of flesh with minute droplets of milk oozing out of the ducts which have been cut. What takes place when the cow goes out to feed is that the cells absorb what they require for their nourishment. When a cell is fully nourished it splits right through the middle, and each half develops into an independent cell; these in turn divide, and so on until the udder is full of these cells or flesh as it really is.

What converts this flesh into milk? Through the whole body runs a network of nerves. If a human being sticks a pin into any part of his body, he will feel it, because it comes into contact with nerves. If he squeezes his finger he feels it, because he communicates with the nervous system. Squeeze a cow's teat and her nervous system is communicated with, and the nerves of the udder break down the cells and manufacture milk. This continues as long as there are any cells in those grape-like bodies to be broken down. When there are no more the cow is milked dry. The reason that the strippings are so much richer than the first milk is that some of the large fat globules become caught in some of the small ducts, and have to be worked out by manipulation.

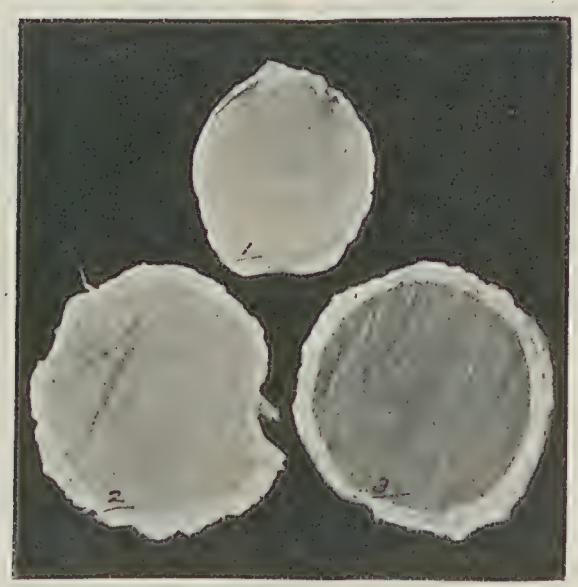
Now, anything that upsets the nervous system directly affects milk secretion. Often we sit down to milk and get half a pint or so from each quarter, and then no more, although there is a bag full. We say she is holding her milk. It is not that she is holding it, but that her nervous system is in such a disturbed condition that it cannot act normally and produce the milk from the material stored up in the udder for the purpose. This shows how necessary it is to handle the cows in such a way that their nerves may not be disturbed. It is easy to understand, therefore, that if a cow be treated to a few blows on the ribs with a milking-stool, or given a kick in the belly or be chased by dogs, her nerves will not be in a condition to enable her to give the yield of milk she is really capable of.

Straining the Milk.

Although every care may be taken to keep the cow yards and sheds clean, the cows groomed, the hands of the milkers and the udders and teats of the cows washed, it will still be impossible to prevent particles of dust, scurf, hairs, &c., from falling into the milk. With ordinary milk strainers only the large particles are prevented from passing from the milk bucket into the cans. In addition to the usual wire gauze, therefore, two or four folds of butter cloth should be used.

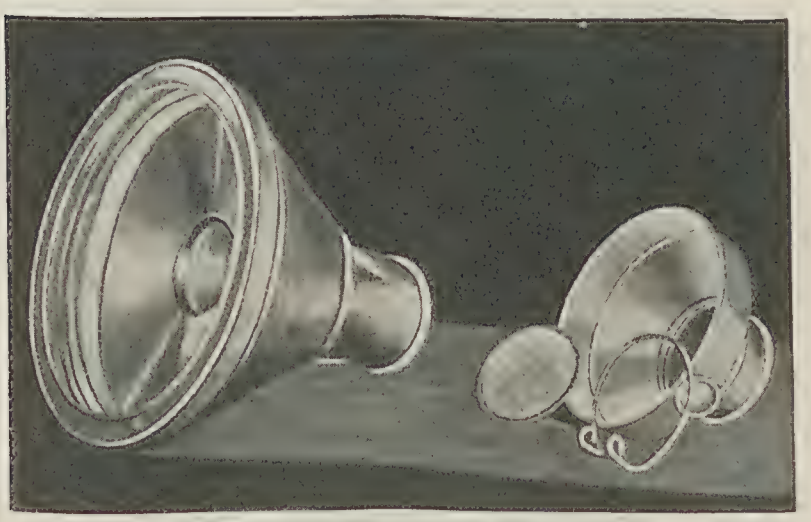


Large Size Milk Strainer.



The above illustrations show the effect of the improved strainer on milk. Fig. 1 is a disc of cotton wool before use, and Figs. 2 and 3 are discs through which 40 and 20 gallons of milk respectively have passed, and it will be seen that the last is very much the dirtiest. Both lots of milk had previously been run through five strainers, two of which were muslin.

Great care, however, must be observed to keep this muslin clean. The best way to do this is to rinse it out with cold or tepid water, and boil it in water in which a little washing soda has been added. To insure cleanliness a good strainer must be used. A very good one on sale consists of wire gauze, and of a wadding disc which is burnt after use, a new disc inserted for each milking. Usually about 40 gallons will pass through the disc before it will require changing. This reduces the risk of contamination through the strainer not being clean and sweet. Unfortunately, there are still some people who consider straining unnecessary, because the milk is only for the factory or creamery, or going to be separated. They fail to realize that as some of the impurities may have been dissolved by the time it reaches the separator, it is then too late to attempt to arrest the taints imparted to the milk, and all that can be done is to detain the coarser particles which may still be undissolved.



Milk Strainers Stamped Out of One Piece.

Utensils.

Most of the utensils used in connexion with milk and cream are made of iron or steel coated with tin. Poor quality cheap utensils have a very thin coat; in fact, the iron is not completely covered. If examined closely under a glass pin holes or bare patches will be seen. In use these bare spots become attacked by the oxygen of the air, and rust is formed, which gradually spreads under the tin coat causing it to peel off, so that the cream is in direct contact with the iron. As the cream ripens acid is formed which attacks and dissolves the iron giving to the cream the well known metallic flavour, causing it to be graded as second class. This would mean an immediate loss to the supplier of 1½d. per lb. If a can contains, say, 40 lbs. of butter fat, the loss due to the rusty can would amount to 5s. It would not take long to pay for a new can if that could be saved. If the rusty

iron be examined under a magnifying glass it will appear honeycombed, and all the crevices filled with filth, as it is practically impossible to clean it. This becomes a source of contamination which may result in the cream being graded below second, in which case the loss would be sufficient to pay for two or three new cans. Only good quality cans should be purchased in the first instance, and immediately these show signs of the tin being worn off they should be retinned. In this way a good quality can may be made to last a lifetime. Cans with galvanized iron hoops should not be used, as they cannot be retinned.

Cleaning Utensils.

From what has appeared above it will be seen that the proper cleansing of the utensils is very important. After a utensil has been used for milk, it should be rinsed with cold or tepid water to wash off the milk. Scalding water should not be used first, because milk contains albumen, which, like the white of an egg, coagulates when it comes in contact with boiling water. This would form a coat of shine in which putrefactive bacteria would develop and inoculate the next lot of milk or cream put into the vessel. First rinse out the milk, then scrub well with hot water and washing soda. This cleans all grease and dirt away. Finally rinse with boiling water, and turn upside down to drain and dry. If a boiler is in use give the utensils a good steaming. If the utensils are not properly cleaned a yellow shine will gradually form, especially round the seams.

(To be continued.)

FLOATING CURD IN CHEESE-MAKING.

By G. C. Sawers, Cheese Expert.

Where stringy, floating, or badly-flavoured curd is met with, faulty milk is invariably the cause. A simple and practical means of testing milk suspected of being liable to yield floating curd is as follows:—

Carefully wash out and steam a number of pint glass jars. Place a sample from each supplied in a separate jar, filling it three-fourths full. Place the jars in a tub or trough of warm water until the milk is brought to a temperature of 98 degrees F. (The thermometer should be thoroughly cleaned after taking the temperature of each sample, otherwise pure samples may be contaminated). Then stir ten drops of rennet into each sample. When the milk coagulates, the curd may be cut with a sterilized knife, and the whey drained off. The water surrounding the jars should be kept at 98 degrees for the next twelve hours. When the curd is cooked, it should be cut through the centre with a sharp sterilized knife, and carefully examined for holes, sponginess in texture, and bad flavour.

Throughout the test, the mouth of each jar must be covered with a damp muslin cloth that has been scalded beforehand.

NAURU AND OCEAN ISLAND.

Reduced Price of Phosphate.

By Harold B. Pope, Commissioner for Australia.

In a report by the writer, recently published by the Commonwealth Government in booklet form, the following foreword appeared:—

> "The greater part of the information contained in the following pages appeared in the *Journal of the Department of Agriculture of Victoria,* in August, 1921, and March, 1922. A few touches of local colour are now added, in addition to which reference is made, at the end of the article, to the reduction in the delivered price of phosphate to the Australian manufacturers, which is to take effect on and from the 1st July, 1922."

As only a limited number of the booklets was printed, and as many readers of the *Journal* may not have had the opportunity of perusing it, the writer proposes to here repeat his closing remarks regarding the reduction to the Australian manufacturers of the Nauru-Ocean Island raw material, which came into operation on the 1st July last. The remarks were as follows:—

> "The delivered price in Australia of the Nauru-Ocean Island raw material for some time past has been from 75s. to 80s. per ton. Current contracts at these prices expire, however, on the 30th June, 1922. For the year commencing 1st July, 1922, the delivered price to the Australian fertilizer manufacturers for Nauru and Ocean Island phosphate will be reduced to not more than 55s. 6d. per ton in the Eastern States, and 58s. 6d. in Western Australia, and an effort is being made by the Commissioners to bring these prices still lower. The Australian manufacturers, in undertaking to pass on this reduction to the farmers, have agreed to the insertion, in their contracts with the Commission, of a clause by which the selling price of the superphosphate sold by the manufacturers shall be adjusted by them in such a manner that the consumers of superphosphate in Australia will have the benefit of any saving in the cost of manufacture arising from the purchase of the Nauru-Ocean Island raw material.
>
> As already stated, 1 ton of phosphate, after being treated and mixed with sulphuric acid, makes nearly 2 tons of superphosphate. It therefore follows that a reduction of at least £1 2s. per ton of phosphate equals a reduction of about 11s. per ton on superphosphate. In justice to the fertilizer manufacturers, it must be mentioned that they will have large stocks of phosphate on hand at the dearer prices on the 1st July, 1922, when the reduction in the delivered price of at least £1 2s. per ton takes effect.
>
> It is impossible to say, at this stage, exactly what further reductions in the price of Nauru-Ocean Island raw material are likely to take place in the future, but when the proposed cantilever is erected, the f.o.b. cost should be considerably reduced. The delivered price is, of course, influenced by freight rates. The fluctuations in these have been mercurial at times in the past, and it is partly

with a view to stabilizing Australasian freights that the Commissioners have decided to take advantage of the present slump in shipping (at the moment of writing, new and suitable steamers can be bought at less than one-third of their original cost) to buy one or two ships for their own use of a special type suited to the requirements of the trade. With an assured annual demand for, say, 300,000 tons in Australia and New Zealand, these vessels would never need to be idle.

In reducing, as far as possible, the price of their raw material to the Australian manufacturers, and in making ample provision for any saving thus effected to be duly passed on, the Commissioners have done all in their power to reduce the price of superphosphate to the farmers, who, so far as their future supplies of cheap and high-grade superphosphate are concerned, can now view the future with equanimity and satisfaction. The more our farmers use superphosphate, the less it is likely to cost them."

Since the foregoing was written, the further foreshadowed reductions in the price of the Nauru-Ocean Island raw material have come into force. Instead of the delivered prices being 55s. 6d. per ton in the case of the Eastern States, and 58s. 6d. per ton in Western Australia, they are now 49s. 3d. per ton, and 52s. 3d. per ton for Eastern and Western Australia respectively. These further reductions also took effect on and from the 1st July, 1922.

The pre-war delivered price of Nauru-Ocean Island phosphate in the eastern States was 46s. 3d. per ton. This was the contract price in contracts extending over a number of years, which were made when freights were very cheap. Judged from the present-day view-point, current freight rates from Nauru and Ocean Island to Australia are low, though they are still about 6s. per ton higher than when the pre-war contracts at 46s. 3d. per ton were made. Taking this into consideration, and bearing in mind that the Commissioners' costs are—as practically everywhere else—about 50 per cent. higher than were the Pacific Phosphate Company's costs in 1913, it is clear that the Nauru-Ocean Island phosphate industry has been one of the very first to right itself in this country. In pursuance of the above reductions in the delivered price of the Nauru-Ocean Island raw material to the Australian manufacturers, considerable reductions in the price of superphosphate have been made. The average Australian price for 36 per cent. superphosphate is now about £5 5s. per ton, as against the pre-war average price of about £4 7s. 6d. per ton, or an increase of, say, 20 per cent., whereas most other commodities are still nearly 50 per cent. higher in price than before the war.

From letters received, it would appear that some farmers are under the impression that the Commissioners are responsible for the price of superphosphate. In so far as the delivered price of the Nauru-Ocean Island raw material enters into the cost of the manufacture of superphosphate, the Commissioners are responsible; but it should be clearly understood that at this point their responsibility ceases, as other factors entering into the cost of manufacture, such as the price of sulphuric acid, labour, grinding and mixing, bags, overhead charges and distributing costs, fall neither within their jurisdiction or control.

MILK FEVER.*

Milk fever generally occurs within three days after calving, although it may come on before calving, or several weeks after. A short time after delivery the cow shows signs of restlessness, raising first one hind foot and then the other, breathes a little more quickly, does not like movement, and if caused to move staggers in her gait, losses her appetite, ceases to chew the cud, and has a staring look in the eyes. The hind limbs give way about twenty hours after onset of disease, the animal falls, and remains down. The eyes now protrude, and may be insensible to the touch; there is general loss of sensation and voluntary movement. The head and horns are more or less cold to the touch owing to a withdrawal of blood from the brain. The animal may be delirious and dash its head about, in which case it must be prevented from hurting itself by padding with bags of straw and chaff, and kept in a sitting position. The animal may become comatose, with head bent towards the shoulder, cannot swallow, bowels do not act, urine remains in the bladder, becomes blown up with wind, more and more comatose, and at length dies.

As soon as it is seen that anything is wrong with the health of the animal, the following dose should be given;—16 ozs. of Epsom salts, ½ lb. treacle, one tablespoonful of ground ginger, in about a quart of warm water or gruel. (This should be given to any cow at any time showing signs of ill health.) The animal should be kept warm with rugs or bags, cold water may be applied to the head, the spine rubbed with a liniment composed of liniment of ammonia, one fluid part, and compound liniment of camphor, one fluid part, or a paste of mustard and turpentine. Half a pint of spirits should be given occasionally as a stimulant (say every three or four hours); methylated spirit will do for this, and is much cheaper than anything else.

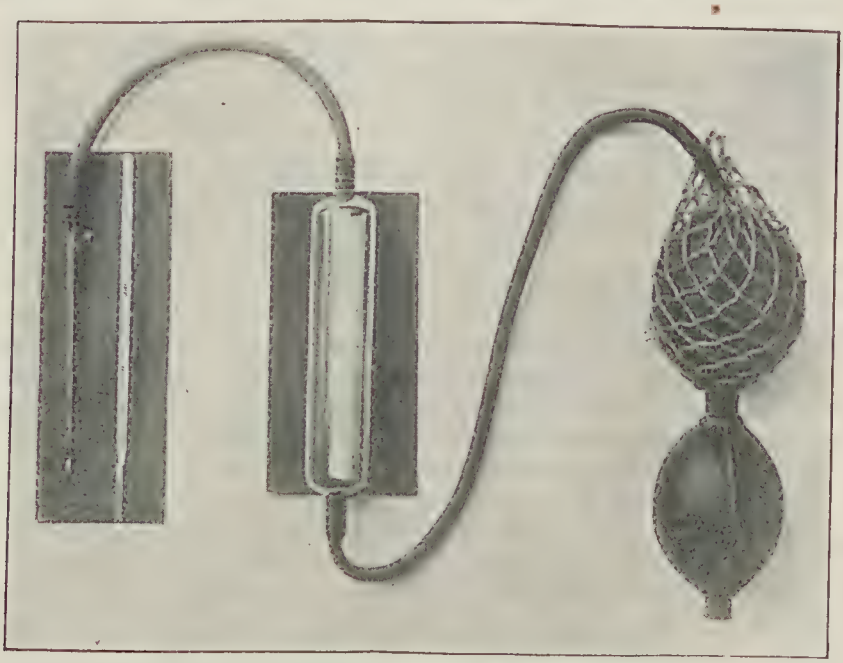
The womb should be flushed with a 2 per cent. solution of lysol by means of a piece of hose pipe passed in by hand. The temperature of a cow in health is 101-102 degrees; in case of milk fever it will be below this, and in other fevers above, and this is an infallible guide as to the nature of the disease, and will distinguish it from a form of blood poisoning, sometimes a trouble at calving. If the cow is insensible, medicine should be given by pushing a piece of hose pipe down the throat into the stomach, and the medicine poured down this direct into the stomach, otherwise it may get into the lugs and either choke the beast or cause inflammation of the lungs. This will also let the gas out of the stomach.

Of all the known methods of treating milk fever, the injection of sterilized air into the udder is by far the most simple and practicable, as well as the most efficacious and harmless one yet tried, and only occasionally requires the concurrent use of medicinal treatment. At the milking herd trials at the St. Louis World's Fair some years ago the Jersey herd competing numbered 41 cows, and 21 of these were down with milk fever. All were saved by air being pumped into the udder

* Reprinted, with some alteration, from the *Year-Book of Agriculture*, 1905.

by a bicycle pump. No medicine was administered internally. The method of injecting the sterilized air into the udder is easy of manipulation, requires but little time, and is readily accomplished by means of a milk-fever apparatus, illustrated below. It consists of a metal cylinder, divided in the centre, one end screwing into the other; a small nozzle at each end, which is inserted into rubber tubing. The cylinder is filled with sterilized wadding. A bicycle pump or an enema is attached to one end by means of 9 inches of rubber tubing, and a milking tube to the other by the same means.

Previous to making the air injection the hands should be thoroughly cleansed, also the udder. Soap and water should be applied to the teats and udder, a clean towel spread underneath to prevent the teats coming in contact with dirt, then they should be carefully disinfected with a 2 per cent. solution of lysol. About a wineglassful of the lysol



Milk Fever Apparatus and Veterinary Thermometer.

solution should be injected into each teat. This will sterilize the ducts of the teat and prevent the introduction of germs that will cause inflammation of the udder. The lower part of the cylinder, the tubing, and milk tube must be sterilized before using for injection. This may be done by soaking in the lysol solution, or by boiling for fifteen minutes and not allowing it to touch anything until inserted into the teat. It is then carefully inserted into the teat after withdrawing the milk. The air is now pumped from the bulb or pump and a continuous flow of air is forced through the filtering chamber and into the udder. Slight rubbing or kneading will cause the innermost recesses of the milk ducts of the udder to be distended with the injected air. After the quarter is

well distended and sufficiently tense, the milking tube is removed, care being taken to prevent the outflow of air by having a broad piece of tape tied round the teat when the milking tube is withdrawn. The same treatment is repeated in the other three teats until the udder is satisfactorily distended. Should the air become absorbed and no improvement is noted, the treatment should be repeated in two or three hours, taking the same antiseptic precautions as at first. The tape should be removed from the teats two or three hours after the cow gets on her feet. A cure will just as certainly be effected by simply pumping air into the udder by means of the bicycle pump or enema and milking tube, but the risk of introducing septic or blood poisoning germs is considerable, hence the adoption of the antiseptic precautions recommended above. Prevention is better than cure, and if the cows are given a dose of salts and kept on short feed for a week or so before calving there will not be much danger. The greatest danger is with cows that are full blooded and rapidly thriving, more so than with fat animals.

THE WORLD'S YIELD OF WHEAT.

The International Institute of Agriculture at Rome reports that an exact estimate of European wheat production in 1922 cannot be made until the figures from France, Germany and the Serb-Croat-Slovene State become available. It is, however, certain that this year's wheat crop from all Europe (apart from Russia, whence no trustworthy data are yet to hand) is decidedly less than that of 1921. As regards those European States which have already furnished particulars, the Statistical Bureau of the International Institute of Agriculture estimates the decrease in yield, as compared with 1921, at 13 per cent. It is also announced that the yield of breadstuffs (wheat, rye and meteil) in Prussia shows a decline of 21.6 per cent., and that threshing results in France indicate that the production of cereals is below that of 1921 and in some districts under the average.

Poor results are manifest also in North Africa, where Algeria, Egypt, Morocco and Tunis have wheat crops amounting to 68 per cent. of last year's.

The good returns of India, Canada and the United States have provided 42.8 million metric tons of wheat this season, or 17 per cent. over those of 1921. The European deficiency and that in North Africa is thus compensated, and it appears probable that the wheat yield of the whole northern hemisphere will, at the very least, prove equal to that of last year.

STOCK IMPROVEMENT.

Where Breeders should Co-operate.

(By J. S. McFadzean, Senior Dairy Supervisor.)

A very large portion of the wealth of Australia is derived from stock and stock products, but the majority of those who make their living from stock-raising are not breeders in the true sense of the word. More usually they work with store stock purchased in the markets, and of whatever class may be offering when grass is plentiful; and should they desire to raise young stock of a better grade they are dependent on a comparatively small number of breeders, who keep pure-bred studs to supply those selected sires that are necessary for such improvement in flocks and herds. Individually, these breeders of pure stock are most progressive people, and their work is of great value to the country. As a body they lack that unity of purpose which is essential to the full advancement of their interests.

In either appearance or utility, pure-bred stock are very much superior to grades or crosses. Consequent on having been selected closely on definite lines over many generations they are more even in both their conformation and production, and the longer each line of breeding has been maintained, and the more rigid the selection exercised, the higher quality is to be found in them. This superiority of pure-bred stock is so marked that only those absolutely wanting in business method disregard its advantages, and to breed stock from any but selected pure-bred males is a display of either ignorance or gross carelessness.

Every step towards more pure-bred stock being raised, and a corresponding reduction in regard to the use of cross-bred and mongrel males, is a national gain, for thereby the acre-production of the land is being increased. The all-round higher market value of well-bred stock is in itself public recognition of superior quality, and is sound reason for encouraging it. Increasing the grass-growing or fodder-producing power of land is frequently mentioned as a most laudable objective, but it is equally important that all grass and fodder should be turned to best account by raising thereon the best grade of stock. It should, therefore, be the constant endeavour of every one who takes an interest in primary production—and all should—to have more improvement in stock-breeding made each year. This will be effected by breeders maintaining their exacting selection in regard to their stud animals; but they require all the support that can possibly be given them by concentrated effort of themselves and others towards the ultimate elimination of the practice of using sires which are not pure-bred and are of inferior type.

Official recognition of the value of pure-breeding in all classes of stock has been made through assistance given to Agricultural Societies by the Government to enable them to carry on their avowed object of stock improvement. Very few of these societies, however, do anything more in this direction than to hold an annual show, at which prizes are given for the best stock exhibits. Almost every breeder of pure stock is a member of such a society, but, broadly speaking, it does little

to assist him. Each of these societies is dependent on the stock-breeders to make a success of the annual show, but in no instance has any of these societies a regulation which requires that its other members should support the breeders by using none but pure-bred sires in their flocks and herds. In numerous cases, members will actually be found to be using mongrel sires. In example alone it will, therefore, be seen that there is much room for improvement. Members of these societies should, without exception, be the progressive agriculturists of their several districts. At present, while some maintain a continuous campaign for stock improvement and are doing valuable work in that line, others take no interest in this important objective of their colleagues, and by careless stock-breeding methods are retrograding instead of progressing. There is much room for co-operation here.

Amongst the pure-stock breeders themselves, a point which calls for serious attention is the fact that they have one common objective, no matter what class or breed of stock they are working with. Usually, each subscribes to some association formed to look after the special interests of one particular breed, and while giving attention to this, the necessity for unity amongst all breeders is overlooked. Concentration on their individual work frequently appears to have narrowed their outlook in this direction. Those who are handling other stock are too often looked on as no more than competitors in regard to sales, and a feeling of antagonism is allowed to obtrude. Consequently, in the endeavour to gain ascendancy in trade, all opposition breeds are discredited, and reciprocation of this attitude shuts off any possibility of mutual interchange of ideas to the disadvantage of both parties.

This state of affairs between breeders is not at all uncommon, and it is only want of thought which causes them to forget their interdependence, and that they are striving towards the one main objective. Even if their lines of working are apparently in opposition it is the education of those who are now handling inferior stock so that they may appreciate the advantages of pure-bred animals, that should be the first consideration. Every breeder of pure-bred stock who in the hearing of a prospective buyer deliberately finds fault with another breed is in some measure defeating his own purpose. All know that pure-bred stock are superior to cross-breds or mongrels on account of their more even type and higher average utility; and to make statements to the prejudice of a rival breed tends rather to create suspicion regarding both than to beget confidence in the one favoured.

Breeders should study to praise their own stock as high as is warranted, but they will be well advised to put in some good word for, rather than an adverse remark on, any and all others. All pure-bred stock will at least reproduce their good quality, and with them reasonable selection will insure speedy improvement; but with cross-breeding no assured headway is possible. Only under a settled line of working can there be definite advancement; and only by the use of pure-bred males can a system of improvement be established. While every breeder should be working with that particular line of stock which is best suited to his surroundings and requirements, he should not be blind to the good points of other breeds, for no one of them has a monopoly of every good feature. Each has some outstanding quality which it may well be given full credit for. Whatever are the advantages of each pure breed, it is

to the interest of every breeder of other stock to know these points, and show their co-operation by putting them forward whenever suitable opportunity offers.

Instances occur where breeders are apparently so fearful of opposition that they freely find fault with animals bred by another, even when these are stock of the same breed as they themselves are handling. When this takes place the other owner is certain to soon hear of it, and the feeling of mutual distrust which will ensue will not be to the advantage of the owners, and at least some harm will have been done to the breed. No breeder should under any circumstances allow himself to make adverse comment regarding animals of his own special breed. Where no good features of another breeder's stock cannot well be brought forward, it would be much better to avoid an awkward question by a plea of being unacquainted with the strain than to be intrigued into saying something which will certainly sound more like prejudice than good judgment, and may do an injustice to the breed generally. Praise of a supposed rival's stock will place that of the breeder on a much higher standard than fault-finding. It is better that his stock should be superior to good stock than to those of mediocre quality. Breeders have repeated opportunities for helping each other, and a mutual feeling of co-operation is to the benefit of all.

There is very much to be learned in stock-breeding. The experiences of any beginner may be useful to even a long-established breeder. No one knows all the points of the breeder's art, and it is from the observance and study of mistakes that success is frequently achieved. Amongst beginners an interchange of experiences may be particularly instructive, and it is always beneficial to have some one interested in the breed to compare notes with. Friendly criticism of one's stock also tends to eliminate any obsession regarding their excellence, and the owner's knowledge of the breed is thus broadened.

At the same time, there is every reason why each breeder of any class of stock should look upon his own breed as the best. It would be a pity if it were otherwise, for only when this idea prevails will the full possible results be obtained from them. The choice of breed is made with some definite object, and the decision rests on that one which appears most suitable under the various conditions. If sound judgment is exercised in the first choosing, only under a change of surroundings or working conditions is it likely that a change of breed will be justified. Each owner may therefore be considered to be handling the breed best suited for his purpose. Having made his own choice, he should be able to grasp the various points of estimate in others, and he should be at least tolerant towards those who have chosen on other lines.

Difference of choice may even be of much advantage between neighbours in generating a spirit of emulation, and certainly should not give rise to antagonism. Working with different breeds, neighbours will have the opportunity of watching the results obtained by each other, and of getting a better insight into the comparative quality of the stock. On the other hand, if neighbours are working with the same breed the advantages to both are increased. There is certain to be variation in their lines of management which will be instructive to both. If they happen to be pioneers of their breed in the district, better headway will be made together than one could attain. More

interest will be centred in the breed through their mutual choice of it, and more weight will be given by onlookers to their combined opinion of the breed than would be accorded to that of a single individual. By competition at local shows, several exhibitors attract additional attention, especially from those likely to buy.

As stated previously, jealousy amongst breeders mainly arises through eagerness in trade competition, but experience soon shows that competition makes trade. Instances can be seen of really good breeds of stock which, in the hands of only one or two breeders, make little headway. This is because their good qualities do not come up for discussion to the same extent as would happen if several breeders were competing with one another. For this reason, old-established breeders should always welcome younger or newer ones. They are admirers and buyers of the same breed, and they will also be advertisers of it. Every way in which a new breeder advances his stock, whether by printed advertisement or by show-ring publicity, he is indirectly benefiting all older breeders. They should encourage him in his work, and never speak disparagingly of his efforts. They could always well spare a word of praise wherever the occasion offers, and coming from those long-established, it is certain to be appreciated.

Another line along which breeders are able to assist each other is in the direction of universal publicity. By owners working together each particular breed can have its utility points brought under special notice in a way that individual breeders cannot possibly carry out. A very striking instance of this has recently been seen in regard to dairy cattle in this State. For many years past the breeders of Ayrshire and Jersey cattle have had associations which issued herd books containing particulars of the breeding and the Show records of their stock. These were circulated amongst the members of each society and a few other people and firms closely interested in stud breeding. These two breeds had also been well represented at agricultural shows throughout the State for some forty years past, yet there was no special boom with either in regard to dairy work. Milking Shorthorn, Friesian, and Red Poll cattle had also been shown for years past without attracting any special attention from dairymen, and until recently these breeds were not represented here by any society, and consequently even had no herd book. With the inauguration of the Victorian Government herd-testing system in 1912—which was mainly brought about by breeders of Jersey cattle—it became necessary for all cows competing to be registered in a herd-book, so with the three last-named breeds associations had also to be formed and particulars of breeding recorded.

The results of each year's herd tests were published in this *Journal of Agriculture,* showing the comparative excellence of individual cows and of the best of the herds. Following on this there was usually a few comments in the newspapers as to the results, and that was all the publicity this most important work obtained. Pure-bred cattle were being systematically tested for their utility qualities, but those for whose direct benefit the work was undertaken were not in touch with it, and the results were far short of the anticipations of those who initiated the scheme. Again, it was the breeders of Jersey cattle who first recognised this to the extent of planning to improve it. By doubling the annual subscription of the members in their society, they provided

a fund for advertising the merits of their breed on general lines. In 1918, all the herd-test records of the breed in the Victorian tests to that date were compiled; and, published in illustrated booklet form, these were circulated throughout the State. By means of paragraphs in the weekly papers, attention was also drawn to these records and to the high dairying qualities of this particular breed. Two years later, a second edition of these records was issued, the publicity work being meanwhile continued, and advertisements were also placed in the press drawing attention to the breed generally. By this time the work was showing results in increased sales of stock for dairying purposes, and breeders of other cattle had the subject forced to their attention through the demand created for Jersey cattle. The Associations representing Red Polls and Ayrshires have consequently both published the records

Jersey Herd Society's Kiosk at Royal Agricultural Society's Show Grounds.

made by their cattle in these herd tests; and with the Friesian breeders, have also put special effort into press publicity. At this year's Melbourne Royal Show, the Jersey Society made another innovation on this same line by having a permanent kiosk erected there for the purpose of distributing information about the breed. This kiosk gave members a place of meeting where they could be found by those desiring to inspect their stock; and as the kiosk was in charge of a member of the Society throughout the whole of the Show week, every one wanting information regarding Jersey cattle could there obtain it fully. In all probability, this line of working will also be followed in future by other societies.

The direct result of all this is a widely increased interest by farmers in pure-bred dairy cattle, which was the objective the Government had in view when the herd-testing scheme was inaugurated. The publicity given to the results of the tests has aroused interest in them all over the State. Hundreds of dairy-farmers are now comparing the yields of their

own cattle with those of the pure-bred stock being tested under Government supervision, and the results are all in favour of the pure breeds. Wider use of pure-bred bulls for breeding dairy cattle is resulting, and higher dairy returns will follow with benefit to all concerned. No one can give consideration to this subject without acknowledging the advantages to the dairying industry of this publicity work begun by the Jersey Society. Their work has indirectly benefited all other dairy breeds through stimulating a competitive spirit amongst owners, but most of all by so extensively drawing attention to the superiority of pure-bred stock. The whole is the result of co-operation.

Unity and loyalty amongst breeders are absolutely imperative in the interests of all. Progress will be hindered in its absence. That all pure-stock are better than those of mixed or indifferent breeding is the point that each breeder should be continually making known, and the excellence of the particular breed that each is working with will then be much more easily emphasized. Open rivalry amongst breeders is good, as the resulting emulation makes for progress; but behind it should lie that true spirit of co-operation which is so essential to universal progress. Unity is strength, and more unity of purpose amongst breeders of all classes of stock along the lines indicated would be for their individual as well as mutual benefit.

WEEDS AND THEIR ERADICATION.

(Continued from page 606.)

By H. W. Davey, F.E.S., Orchard Supervision Branch, Department of Agriculture.

Onion Grass or Guildford Grass (*Romulea cruciata*).
Family: *Iridaceæ.*

There appears to be with many people, a certain amount of confusion between the plants known as Onion Grass and Onion Weed. The former (Fig. 49) belongs to the *Iridaceæ*, to which family also belongs the weed known as Cape Tulip (*Homeria collina*), both of which are natives of Africa, while the Onion Weed belongs to the family *Liliaceæ.*

Onion Grass is a bulbous plant, from which arise seven to twelve, or even more, grass-like leaves, which are slightly grooved on each side. The flowers are of a purplish-pink colour, and are usually from three to five in number.

Like other bulbous weeds, Onion Grass is a difficult plant to eradicate once it has become well established. It delights in hard, compacted soils in exposed situations, which is a reason why it thrives so well on roadsides in so many parts of the State. It dislikes loose soils, and cultivation should be practised wherever possible. In addition to increasing by means of corms every year, it is also a fairly prolific seeder; the seed is carried about by stock, and in this way is spread over very large areas. Cockatoos may often be seen feeding on Onion Grass, and where these birds are plentiful, they doubtless afford some check to its increase.

Onion Grass, *Romulea cruciata*, carrying nearly ripe seed.

Onion Weed, *Asphodelus fistulosus, L.,* **carrying seed vessels.**

Where cultivation is possible, it should be carried out, as this is the best and surest means of getting rid of the plant.

When Onion Grass occurs in lawns, as it often does, frequent close cutting will kill it. Its vitality is shown in its being able to force its leaves up through asphalt paths, in cases where the corms are not removed before the work of asphalting has been carried out.

Onion Grass is proclaimed for the whole of Victoria.

Onion Weed (*Asphodelus fistulosus*, L.) Family: *Liliaceæ*.

This native of Southern Europe is a perennial; it has cylindrical hollow leaves, which give it somewhat the appearance of onion or shallot stalks. It has long fibrous roots. The flowers are numerous, and of a pinkish-white colour. It is a useless species, being rejected by stock; in consequence, it has become very prevalent in many parts of Victoria, and, if left uncontrolled, soon takes possession of the ground.

Onion Weed (Fig. 50) increases both by seed and offsets, but can be easily suppressed by cultivation. On grazing land, its control becomes much more costly, necessitaing the plants being either hand-pulled or hoed out, and collected and burnt. These operations are best carried out when the plants are flowering, as at this time the majority of weeds are most easily injured, and this applies particularly in the case of Onion Weed.

Onion Weed is proclaimed in the following municipalities:—Queenscliff, Bellarine, South Barwon, Port Fairy, Swan Hill, Maldon, Warrnambool, Flinders, and Karkarooc.

(*To be continued.*)

WORLD'S PRODUCTION OF BEET SUGAR.

The International Institute of Agriculture is now in possession of practically complete data as to the production of beet-sugar in the European countries and in the United States during the season ended 31st August, 1922.

From these data the total production of Europe and of the United States is estimated at 4.8 million metric tons of raw sugar, showing a 6 per cent. increase over the corresponding production of last year. For the coming season, data have been already furnished regarding the production of sugar-beet in Belgium, Bulgaria, Hungary, Netherlands, Poland, Switzerland, Canada and the United States; altogether, will be 10 per cent. below 1921. In Germany, despite the rains during August, sugar-beets have made no improvement, and nothing more than an average yield can be expected. In Czechoslovakia the yield is expected to be above the average, and in France the crop condition points towards a good yield, and in some departments even an excellent one.

THE BREEDING AND MANAGEMENT OF GEESE.

A. V. D. Rintoul, N.D.D., Chief Poultry Expert.

Goose breeding might be profitably carried on in some of the old mining districts in the State where land is not specially valuable. The two principal breeds of geese are the Toulouse and the Embden. The standard weights are as follows:—

Toulouse gander, 20 lbs. to 26 lbs.; goose, 16 lbs. to 20 lbs.

Embden gander, 18 lbs. to 20 lbs.; goose, 16 lbs to 18 lbs.

The Toulouse goose originated in Toulouse in Southern France, and is the largest variety known. In colour it is dark grey on the back, shading to light grey and white on the breast, and white on the abdomen. The eye is brown, the beak lightish orange, feet and webbing orange. The body is massive, broad and deep, of medium length, practically touching the ground. The female lays from about 18 to 36 eggs a year, but is not a good sitter.

The Embden goose originated at Bremen, and is pure white in colour, hardly as large as the Toulouse, but rather more upright. The female lays nearly as well as the Toulouse, but is a better sitter, the young goslings grow quickly and mature early. Where hatching by hens is practised, the usual custom is to give four goose eggs to one hen, the hatching period being about 30 days.

Geese subsist largely on grass, which they graze fairly closely, and other stock do not care to follow them on pasture land. They can be housed very economically as they need protection only from the wet.

Breeding.

Sex is not easy to distinglish in geese, but the gander is usually larger, and has a more shrill cry than the goose, which has a more guttural note. He is also usually rather lighter in colour than the females. A male is best mated with not more than four geese.

The smallness of the geese in Victoria is partly due to the custom of breeding from very immature stock, as they are not really mature until the third season, and may be kept on for another three or four seasons afterwards.

Hatching.

The eggs should be removed regularly as laid, and set under hens. If the eggs are not removed, the goose will stop laying sooner than she otherwise would. Eggs set under a hen should be turned regularly, as they are rather large for the hen to turn. About eleven eggs may be set under a goose. Though the use of incubators for goose eggs is uncommon, there is no reason why it should not be used. With

goose eggs, the machines should be run at from about 101.5° to 102.5° Fahr., and kept rather more moist than is usual with hen eggs. The young goslings hatch somewhat slowly under hens, and should be carefully watched for head lice, to prevent which some lard may be smeared on the head.

Feeding Young Goslings.

No feed whatever should be given for the first 36 hours or so, though fresh water may be provided, also plenty of grit. Bread crumbs and milk may be given as a first feed, with finely chopped green stuff. Barley meal, pollard, and maize meal may be given for the next two or three weeks, after which—if plenty of green stuff is available—they will need only about one feed a day.

Fattening for Market.

When topping off for the market the geese should be kept confined in small flocks of twenty or so, and fed on oat pollard, barley meal, and maize meal, with any separated milk that may be available, green feed also being fed once a day.

The birds should be disturbed as little as possible, and will put on an increase in weight of 4 or 5 lbs.

In America a system of hand feeding called "noodling" is practised, about ten geese being kept in a small pen of about 8 feet by 12 feet. The birds are hand crammed by the operator, who sits on a box with the goose between his legs, and stuffs the "noodle" or bolus down the goose's throat. They are fed up to five times a day at four-hour intervals, and the food is worked down by the hand on the outside of the neck. The "noodle" or bolus is about 2½ inches long, made of equal parts of wheat meal, oat pollard, barley meal, and maize meal.

From 50 to 100 geese per day can be fed in this manner by one man, though this will mean that his hours of work will be prolonged. The birds will put on up to 10 lbs. increase in weight, and the value per pound weight is also much increased. During 1921 the price for geese varied in New York from 28½ cents per pound to 15 cents per pound, as against 37 cents down to 23 cents for fowls.

Killing and Plucking.

Geese are usually killed by bleeding from the main artery in the mouth, being at the same time struck a blow on the back of the head. Plucking is not easy, and is often done "wet" instead of dry, by steaming the feathers prior to plucking.

Individual weights of up to 40 lbs. have been obtained by the hand cramming process.

In America goose feathers fetch high prices, even up to one dollar a pound for the pure white feathers.

CASSE.

WINE DEFECTS NOT DIRECTLY CAUSED BY MICRO-ORGANISMS.

By F. de Castella, Government Viticulturist.

(Continued from p. 621.)

Bottle Age.

The second stage of the maturation of wine mainly occurs after the wine has been bottled, though it may also develop, but usually in lesser degree, on lengthy storage in receptacles of larger capacity. It constitutes what is usually known as bottle ageing, and is mainly characterized by the development of bouquet and aroma in the wine. These terms, though almost synonymous, are not entirely so. Some writers, in fact, distinguish between the two, looking upon bouquet as the fragrance discernible by the sense of smell and perceptible by the nose; whilst aroma is detected at the back of the palate when the wine is tasted.

Both bouquet and aroma—if any distinction between them is admitted—are due to the presence in the wine of fragrant substances resulting from the reaction on one another of the various constituents of the wine during prolonged storage in closed vessels of small capacity.

The reactions which occur during this second stage are of far greater complexity and less thoroughly understood than the oxidation phenomena characteristic of cask ageing, which were so ably investigated by Pasteur. They seem to belong to three distinct groups of chemical reactions:—

1. Formation of Esters, or Esterification.
2. Aldehydification.
3. Elimination of higher alcohols.

Concerning the relative importance of each, authorities are by no means in agreement. Further investigation may lead to considerable modifications in some of the views expressed below, which are a *résumé* of our present sometimes contradictory knowledge of the subject.

Esterification.

Esters or, as they were formerly termed, ethers, are compounds between an acid—usually organic—and an alcohol radicle, just as mineral salts are combinations between a mineral acid and a base. When acetic acid acts for a sufficient time on ordinary alcohol or ethyl hydrate, it combines with the radicle ethyl to form ethyle acetate, or, as it is often termed, acetic ether—the substance which gives to pricked wine its characteristic bouquet or odour.

Wine is a complex mixture, in which are to be found, in addition to ordinary or ethyle alcohol, which constitutes from 8 to 20 per cent. of its bulk, minute quantities of higher members of the same series,

such as protyl-, Butyl-, amil- alcohols, &c. It also contains various acids; tartaric, malic and citric are the principal ones present in the grape, but during fermentation others are formed normally, such as succinic and acetic,* whilst basterial action is often responsible for the appearance of additional ones, such as lactic, butyric, propionic, tartronic, and some others. These fermentation acids, as distinguished from those which exist originally in the grape, though only present in extremely minute quantities, seem to play an important part in the development of the bouquet of a wine. The reactions which take place between these and the different alcohols result in the formation of esters, most of which are so extraordinarily fragrant that mere traces are capable of communicating to a wine a distinct aroma or bouquet. The number of different esters, the presence of which is possible in a wine, and the very minute—in fact, almost imponderable—quantities in which they usually occur, render the problem very complex and difficult of investigation. It is, however, very generally admitted that the bouquet of an old bottled wine is largely due to the presence of esters, and that these are mainly formed during its sojourn in bottle. Pacottet points out how, in bottle, "The chemical etherification phenomena of the fixed and volatile acids under the slow action of alcohol take place, and the ethers (esters) thus formed increase the flavour and bouquet of the wine. These ethers increase during the whole of the ageing of the wine. The greater the alcohol-acid content the more pronounced are they."

Esterification is a slow process, and one which seldom reaches an advanced stage; in this it presents a marked difference to the ordinary reactions of inorganic chemistry, which are more rapid and complete. If, for example, to a mixture of 10 parts of alcohol with 90 parts of water a quantity of acid, sufficient to combine completely with the alcohol, be added, this acid will not disappear entirely, but only a small proportion of it, which is known as the esterification coefficient. According to Fallot (R. Vit. 21, XII., 1905):—

Berthelot succeeded in determining almost mathematically the proportions of ethers which will develop in a young wine. This proportion depends on the nature of the medium, its content in acids, alcohol, and water. If water be added to an ether, this is partially decomposed, up to the point when equilibrium is established. He made up mixtures of alcohols, ethers, and acids of similar composition to wine, which were exposed to the action of time at different temperatures. After a lapse of several years, analysis permitted the determination of the proportion of acid and alcohol which disappeared and the quantity of ether which had formed. As a result, the following laws governing etherification were formulated:—

1. Formation of ethers always takes place.
2. Equilibrium of etherification depends on time.
3. The proportion of ethers formed tends towards a limit which is only attained after several years.
4. Temperature has no influence on the quantity of ethers formed, though it accelerates etherification.
5. The etherification limit depends on the proportions of water, alcohol, and acids which interact.

* Though the presence of acetic acid is usually looked upon as a defect which renders the wine unsound, this is only so when it is present in appreciable quantity. Even the soundest and best wines contain traces of this acid.

A practical result of these data is that addition of water or of a wine lower in alcohol or acid content may, by upsetting equilibrium, destroy a part of the ethers which have developed. The wine thus loses part of its bouquet. Addition of alcohol or acids tends, on the contrary, to increase etherification.

The proportion of ethers which develop in a wine varies between 2 milligrammes and 1 gramme per litre. The richer the wine in alcohol and acids the higher will it be.

Berthelot has drawn up tables which render it possible to forecast the proportion of alcohol or of acids which will etherify. Thus, with a wine of the following composition:—

Alcohol	10 per cent.
Acid (as sulphuric)	.4 per cent.
Dry extract	2.5 per cent.
Water	67 per cent.

the table show that .5 gramme of alcohol per litre should become etherified. The process is, however, very slow. At the end of two years, there will be fifteen-sixteenths only of the total quantity of ether which should form.

Bacterial Action.

It would appear that bacterial action may play a much more important part in the normal maturation of sound wines than has been realized until quite lately.

We have become so accustomed to look upon the presence of bacteria in a wine as *primâ facie* evidence of its deterioration that the assignment of any beneficial action to this class of organism will come as a surprise to most cellar managers. This older view is no doubt correct in the majority of cases; whenever bacteria are plentiful it is safe to consider the wine as doomed if not already unsound. As Bouffard wrote in 1911, "The fear of microbes is the beginning of wisdom," from the cellarman's stand-point.

And yet, in small numbers these organisms—or at least some of them—seem capable of playing a not unimportant part in the development of bouquet. Nor should this surprise in view of the fact that most young wines, after the first racking, show under the microscope, at least slight bacterial contamination, few indeed are altogether free from it. Morphologically, a distinction must be made between two groups of organisms. Long, slender, wavy rods (tourne group) are as a rule symptoms of more or less severe trouble; their presence is always a sign of danger. Diplococci (figure 8 shape) are much less grave, and it is to this group that bouquet producing bacteria probably belong.

Laborde's remarkable investigation on the changes taking place in wine during maturation throw much light on this phase of the question. In his introduction to a series of articles* he points out how the slow modifications characteristic of ageing

"have for their cause chemical and physiological phenomena of great complexity. The chemical side is certainly the most important; it consists of two principal actions—oxidation and etherification.

As regards the development of living micro-organisms in the wine, it may influence the above phenomena to some extent, without ageing being otherwise than normal. If, however, the wine should undergo too severe modification in its constitution, it becomes affected by the diseases known as Pousse or Tourne, of bitterness or ropiness, diseases which altogether interfere with the bottle-ageing of a wine."

* *Revue de Viticulture*, 11th April, 1918, Vol. XLVIII., p. 225.

He points out how—

Under ordinary storage conditions anaerolic micro-organisms are rarely absent. Most often, in spite of the wine being perfectly constituted their moderate development slightly increases the volatile acidity without hindering improvement in quality. When this acidity has reached a certain proportion, thus reinforcing the specific resistance of the medium action stops completely.*

Experiments are described in which different samples of a wine of 1905 vintage were purposely inoculated with two distinct bacteria. One of these cultures designed "A" was isolated from a slightly bitter *bourgogne,* whilst the second, known as "B," was from a white wine from Charente inferieure affected with ropiness.

After eight years the wines were tasted and analyzed.

In comparison with sterilized control samples of the same wine, the total acidity of which had reduced, that of both inoculated wines had increased. These also showed an increase of volatile acid, both free and etherified, about equal in each case.

If the ratio E/T had not materially changed it is because bacterial action was only slight. Nevertheless, the increase in ethers is rather noticeable, proving that both organisms were, from this standpoint, desirable ones.

If, to the taste, there is not much difference between the development of the two organisms, there is a marked difference in the "nose", a more pronounced bouquet being detected in wine "B" than in "A." The former had also a quite distinct odour, more accentuated, and reminding of truffles. To the taste, "B" also showed more refinement.

There thus exist, among the disease ferments of wine, improving and deteriorating races, just as there are good and bad alcoholic yeasts. It can therefore be seen that the suppression, by pasteurization, of all bacterial development during the ageing of wine may sometimes lead to results inferior to those furnished by the same wine if not pasteurized. Of course, for it to be thus, bacterial action must not exceed a certain limit, variable, however, according to the nature of the wine.

Aldehydification.

Ethyl-aldehyde has long been looked upon as a normal constituent of wine, though in very variable quantity. It abounds in sherry, and is probably plentiful also in Madeira and Port, in fact, in all wine having a *rancio* character. It is particularly abundant in wine on the surface of which *mycoderma vini* (flowers of wine) has developed.† Recognition of the important part it plays in maturation is mainly due to Trillat's investigation, the results of which were published in 1908.‡ Trillat had previously shown (in 1893) that if formol or formaldehyde is added to a wine, it combines with the colouring matter, precipitating it in an insoluble form to such an extent that complete decolouration is thus possible. Ethyl-aldehyde acts similarly, though in a less pronounced manner, causing a cloud, followed by the formation of a sediment, altogether similar to that normally thrown by many wines. Trillat's communication of 1908 describes further investigations on the same subject. It was reviewed by L. Roos in *Progrès Agricole,* of 24th January, 1909, wherein he points out how—

"Mere exposure to air, of a weak aqueous solution of alcohol, provokes the formation of aldehyde by oxidation of traces of its alcohol. . . . In the case of wine, the quantity of aldehyde produced is very much greater."

* *R. Vit.*, 1st August, 1918.
† X. Rocques, in *Revue de Viticulture*, 22nd March, 1902; also *ibid.* 26th February, 1903.
‡ M. A. Trillat, in *Annales de l'Institut Pasteur*, November, 1908.

. . . . the nature of the sides of the container, and the composition of the medium, exert their influence. The presence . . . . of micro-organisms, such as yeast and bacteria in suspension in the liquid, accelerate its formation. In like manner, certain substances in solution, such as enzymes, or even certain mineral substances—manganese; iron, &c., which act somewhat like enzymes—play a similar part.

The absolute quantity of aldehydes produced is always very small, at most one five-thousandth of the total volume, but this quantity is nevertheless considerable so far as the important effects it may cause. . . .

Aldehyde, if too plentiful, may play an undesirable part . . . . by increasing the action of oxydase in different cases of Casse. By polymerization it produces substances with a very persistent bitter taste. According to M. Trillat, the characteristic flavour of wines affected by the disease known as bitterness is due to these aldehyde-resins.

In lesser quantity, such as may be termed normal, the part played by aldehyde is not less interesting. It is slowly transformed into acetal and acetic acid, substances which contribute to the formation of bouquet of wine or of the brandy distilled from it.*

It is likewise aldehyde, either as such or in the form of acetal, which is derived from it, that causes changes in the colour of red wines.

Trillat's ideas concerning the important part played by aldehydes in the maturation of wine, attracted very much attention in wine-making circles. Roos, in the review already referred to, highly eulogizes his work. He, nevertheless, points out that "If he (Trillat) has not proved that ethyl-aldehyde plays a preponderating part in these (maturation) phenomena, he has at least shown that it participates to a sufficient extent for its influence to merit further study and investigation, a view which is shared by most standard writers on oenology. An excellent review of Trillat's investigations and results was contributed to *La Revue de Viticulture* of 27th May, 1909.

Elimination of Higher Alcohols.

That this is one of the changes which accompany maturation of wine is evident from investigations conducted by Kayser and Demolon†, which led them to the conclusion that wines stored under aseptic conditions and exposed to moderate aeration, yielded, on distillation, spirit showing a marked reduction in the content of higher alcohols. Aldehydes and esters, on the contrary, were rather increased. They point out how—

> "It has previously been noted that the ageing of spirits may be compared to a true rectification. It is now recognised that aldehydes play an important part in this direction, thanks to the

* See also X. Rocques, *Revue Vit.*, 26th February, 1903. Aldehydes combine with alcohol to form acetals, which are to be found in wines and brandies. They are highly aromatic substances, some of them being distinguishable if present at the rate of 1 in 10,000. It is probable that acetals play a part in the bouquet of wine.

† E. Kayser and A. Demolon, in *Revue de Viticulture* of 18th July, 1912, Vol. xxxviii., p. 65. Influence of several factors, and particularly calcium salts, on the ageing of wine in the presence of yeast. The investigations described were mainly undertaken with a view of elucidating the influence of limestone soils on the quality of brandy distilled from vines grown on such.

formation of acetates capable of resinification. We have noted the same fact in the aseptic ageing of wine, which is characterized by a marked diminution in the higher alcohols content. As regards aldehydification and esterification, these also take place."

This is a phase of the question which does not apear to have received the attention it merits.

Laborde's Investigations.

Probably, the most exhaustive and authoritative research work undertaken of recent years in connexion with the ageing of wine was conducted by Laborde, who published the results in a series of articles which appeared in *La Revue de Viticulture* in 1918. The final articles were only printed after his untimely death, in July of that year.

The following extracts from his general summary will give an idea of the present state of our knowledge on this complex question. On comparison with previous quotations, it will be seen that, on some points at least, there still exist considerable differences of opinion:—

Laborde recognises, in the first place, that the part played by oxidation in the normal ageing of wine remains, on the whole, the same as has been known since the work of Berthelot and Pasteur, consisting in modifications in the taste, in the bouquet, and in the colour of the wine.

During the sojourn in bottle, oxidation may be very much reduced without the transformation of the wine being seriously checked, since quite pronounced ageing can take place in full bottles, the necks of which have been sealed in the blow-pipe flame. Under such conditions, it is brought about solely by the quantity of oxygen absorbed during and previous to bottling.

The coagulation of tannoids progresses more or less rapidly, but solely under the influence of direct oxidation; only a trifling part can be attributed to aldehydification of alcohol under normal conditions, with corks of good quality, wines which remain sound, and before ageing has yet reached an extreme degree.

Slight bacterial action may hinder oxidation for a long time, and considerably retard the conditioning (depouillement) of the wine.

In wines which are more affected (by disease), aldehydification is usually more marked because the bottle leaks, and the resulting ullage favours oxidation, and consequently the more rapid precipitation (depouillement) of the wine. The change in the composition of diseased wines (tourne or bitterness) has likewise an influence on the coagulation of tannoids, which is supplementary to the last named.

In the case of "Bitter disease," the very bitter taste met with, more particularly in very old wines, seems connected with the presence of various aldehydic substances, such as acetic and acrylic aldehydes; these, after polymerization and oxidation, are, according to Trillat and Voisenet, responsible for the bitter taste.

Etherification, which would seem, according to Berthelot's formulæ, to be of considerable importance, is, on the contrary, a very limited reaction, the fixed or volatile ether contained in wines which have aged normally being almost exclusively derived from the fermentation of the must. These formulæ do not, thus, apply to wine, which is too complex a substance, and which, even if completely protected from contact with air, is the seat of many other slow reactions, very difficult to specify. I have, nevertheless, observed, especially in certain sterilized wines, a real, though very slight increase in total volatile acidity, which is simultaneous with a decrease, usually much more appreciable, of fixed acidity.

Taking the ratio of etherified volatile acidity to total volatile acidity—in other words, the ratio E/T, it will be noted that its value averages 0.30 for wines of Gironde (clarets), being remarkably constant in the case of normal ageing, even over very lengthy periods exceeding 30 years. This result thus confirms conclusions relating to the small importance of etherification during

ageing. Further study of the ratio E/T might perhaps enlighten us concerning the influence of the cultural conditions under which the grapes were grown, and of the wine-making method, on the quality of the wine, and permit the fixing of a fairly precise distinctive character for the wines of the different regions which prove capable of prolonged improvement in bottle.

Thread-like ferments (bacteria) in wine can augment, to a greater or lesser degree, the initial quantity of etherified volatile acid at the same time as that of the free volatile acid. These seem really to be producers of ethers, as are also alcoholic yeasts; but the ratio E/T is, as a rule, smaller with bacteria than with yeasts, with the result that this ratio falls progressively as the injury caused to the wine becomes increasingly noticeable.

This influence of bacteria, provided it remains below a certain limit, is sometimes favorable to quality of a wine by reducing the fixed acidity and improving the bouquet. Unfortunately, the special races of bacteria possessing these properties are little known, and probably rare. Were they better studied, they might, perhaps, be worth propagating for wine-making purposes, as is done in the case of selected yeasts.

Notwithstanding what is known concerning the variations in the quantity and quality of volatile ethers during the ageing of wine, the development of bouquet still remains, at least in part, a mystery. As was thought by Berthelot, and especially by Pasteur, it also depends on the slow oxidation, which modifies the aromas, originating solely in the grape, the subtleness of which becomes very great. If bouquet increases from the time the wine is bottled, it is because all evaporation is prevented of the different odoriferous substances which are subsequently formed.

As regards the influence of aldehydification, or, perhaps more correctly, of acetalization, it only seems capable of influencing the bouquet when the oxidation of the wine is very much advanced, and consequently when it begins to be "worn" by losing more and more of the qualities which it had acquired during normal ageing. This conclusion does not, however, apply to liqueur wines, which owe to energetic oxidation a great part of their special characters.

OLD JOURNALS OF AGRICULTURE REQUIRED.

The issues of this *Journal* for the months of September, 1920, and January, February, and August, 1921, are out of print.

As requests for these issues are being received, principally from libraries desirous of completing their sets, we would be grateful if any of our readers possessing copies for which they have no further use, would post them to the Department of Agriculture. Postage will be paid by the Department.

AGRICULTURE ON THE HIGHLANDS OF CENTRAL VICTORIA.*

A study of the rainfall map of Victoria shows that there is a small block of country, mostly in the central north district, roughly some 36 miles by 12 in extent, running east-north-east from Newlyn as far as Mt. Macedon and south from Newlyn to Bungaree, and from Kyneton to the top of the Dividing Range. This country is over 1,800 feet above sea level, culminating at 2,500 feet near Bullarto, and at 3,324 feet on Mt. Macedon, and it enjoys an average yearly rainfall of from 30 to 40 inches. The climate is very healthy and bracing, bleak in winter, with night frosts hard enough to make the ground like iron, though the mid-day sun soon thaws them, and snow, which often falls, but rarely remains over 24 hours on the ground. The winter winds from the south are very bitter and tell severely on live stock where the shelter of timber has been removed. The bulk of the rain falls in winter, and comes in from the north, and when the wind veers south-west the weather as a rule takes up; but occasionally some of the heaviest rains have come in from the south-east. In summer the weather is comparatively dry, but it cannot be said that a real drought is ever experienced; in fact, the climate approaches nearly to British conditions, except that in the United Kingdom the rainfall is more diffused throughout the year, and the winter is colder.

The bulk of this hilly country overlies the slaty, sand, and ironstone and quartzite rocks, interspersed with volcanic eruptions of basalt or bluestone. The soils are largely clay and sandy loams, and along the water-courses are wet deposits of black soil. Where the volcanic rocks are decomposing there are areas of red and chocolate soil, which are rich in available plant food. Owing to the tilt of the lower strata of rocks the natural drainage is good. The soil is generally well supplied with potash, but the natural phosphoric acid content is low, like the rest of Victoria, the average being less than 50 parts of phosphoric acid to 100,000 parts of soil, which will not bear comparison with similar British soils, where phosphoric acid averages 98 parts per 100,000. The land naturally contains but little lime, and what there is will be found mostly in the volcanic soils, where the steam cells of the honeycombed basalt contain lime in the form of zeolites, which probably accounts for the extra fertility of these soils. However, the quantity of lime there present is small, and heavy cropping and over-stocking soon reduce it, and acidity of the soils is general. The heavy winter rains also leach out the lime, and the same applies to the nitrogen, for which the land cries out if any growth of vegetation is expected.

At one time the district was heavily timbered with eucalypts, such as Peppermint, Messmate, Swamp and White Gums, which alone can withstand heavy frosts. Black or lightwoods and Silver Wattles are common, and exotic trees like Pines, Cypresses, Poplars, Willows, and Oaks do well, and it is one of the few parts of Australia where the Beech will thrive. Fruit trees do well, especially the small red fruits,

* This article has been contributed by a farmer in the district described. The suggestions made are practical, and will no doubt be of interest to agriculturists in the district and in others where somewhat similar conditions obtain.

like currants and gooseberries, but the climate is too severe for citrus culture. Maize will not ripen, but other cereals, especially oats and rye, do well, though rust is troublesome in some seasons. Up to 30 years ago the White oat was universally grown, but the Algerian oat has since displaced all other varieties, and as time has gone on the tendency has been to sow cereals much earlier than formerly, and experience shows that Algerian oats sown in March do best in the long run. Peas were much grown, alternating with potatoes, but the quantity now harvested is small. Potatoes are one of the main cash crops, and yields of 10 tons to the acre were often obtained in the early days, but in time the yield decreased to an average of 3 tons and less per acre. Of the varieties grown, Carman I. is the first favorite, and the Snowflake for the later crops. Turnips used to be grown in the paddock, and one hears of phenomenal crops having been seen, but now few are grown outside the kitchen gardens. Rape as a summer crop is common, and when rain falls in summer it does well, but if sown in autumn the heavy rain makes it impossible to feed off, and when spring comes the plant at once rushes up into flower. Lucerne has been tried on a few farms, but is not a general success; it does best on high land, but as more than two cuttings cannot be relied on in one season, it is doubtful if it pays as well as Cowgrass clover, which grows well everywhere, and often yields two cuttings in the year.

The district was early settled in small properties during the fifties of the last century, and what speaks well for the country is the fact that many of the farms are in possession of the grandchildren of the original settlers. Latterly, since the advent of the rabbit and the gradual decrease in fertility of the soil, the tendency has been towards the aggregation of the small farms into larger grazing areas, and consequently the population is diminishing. At Tylden, for example, the school attendance averaged 80 children formerly, whereas now it is hardly 30. The lure of the cities and the returns from cheaper land in the north and north-west of the State have led many of the younger men to leave the district. At one time gorse hedges and log and chock fences were a general feature of the landscape, and a pack of fox hounds was maintained at Kyneton some thirty years ago, but the rabbit led to the substitution of wire fences, and the use of barbed wire stopped the hunting and checked the breeding of hunters for which Kyneton was famous.

The rabbit is not the only cause of the decrease of soil fertility, but the practice of selling the cereal hay crops off the farms has played its part, and the land is now having a period of rest by the conversion of much of the arable land into grazing areas, but the grazing quality of the land is not of a high order, owing to the fact that there is practically no growth in the grass from May till the end of September, and it is further evidenced by the now general absence of clovers. Old residents will tell how the grass paddocks used to be white with clover in the spring, and how the presence of Perennial Rye grass was universal, but latterly Creeping, Bent, Fog, and Twitch grasses have invaded the land, and it is known that these prefer to grow in acid soils. However, where lime and phosphoric acid are applied to the pastures the clovers at once return, and when these put nitrogen into the soil the Rye grass resumes its sway. Cape weed does not thrive, but the Californian

thistle has invaded many a farm, and the Asphodel or Onion weed has reached the roads near Woodend.

Rotation of crops in the past did not receive much attention. Potatoes were often grown twice in succession on the same ground, and two and three oat crops running were quite common, but slowly the need of a system of rotation has begun to be realized. Too often the stubbles of a cereal crop were allowed to come back to grass by the unaided efforts of nature, which meant that Bent and Fog grass, Dandelions, Sorrel, and other weeds occupied the land to the exclusion of the better grasses and clovers. The denudation of the soil lime led to peas ceasing to be popular, and the use of commercial phosphatic fertilizers has only been general in recent years, but even now on many farms cereals are still sown on volcanic soil without any manure at all. The wonderful effects of 56 lbs. of superphosphate per acre in the Wimmera and Mallee were expected to yield similar results here, but latterly heavier dressings of phosphate are found to be necessary. However, the general presence of iron in the soil leads to the reversion of much of the free phosphoric acid in this manure into phosphate of iron, which refractory compound is so insoluble that much of the phosphoric acid is lost to the farmer. Where lime is present in the soil, the phosphoric acid at once attacks it, forming the dibasic phosphate of lime, which, so slowly soluble, is available for plant growth. When ground limestone could be bought for 10s. a ton f.o.r. at Curdies River, it paid to use it, many giving half a ton per acre as a dressing with success, but the present price, including bags, being 38s. 6d. per ton, plus the railway freight to Kyneton 8s. per ton, its cost is prohibitive. In New Zealand the railways carry lime at a merely nominal rate, and if this example were followed by the Victorian railways, the result would be a greater amount of produce leaving the district. Before the war, basic slag was used by many with good results, and the basic phosphate now on the market leads to soil improvement, and is useful in this district with such a heavy rainfall, and some farmers are now using this fertilizer with all their crops. One ton of basic phosphate is made by mixing 18 cwt. 1 qr. 7 lbs. of superphosphate with 3 cwt. 3 qrs. 21 lbs. of lime, and contains 14 per cent. of dibasic phosphate of lime and 3 per cent. dibasic phosphate. In addition, there is present some 38 per cent. of sulphate of lime, which in the soil becomes converted into carbonate of lime, setting free the potash in the ground. Potash is essential to the formation of the yolk in sheep's wool, and the sulphur is a constituent of wool and plant growth. The phosphate of lime enters into the herbage, making it more palatable, and thus goes to build up the bony framework of all farm animals.

While attention has been directed rather to the development of the wheat areas, this district has been left in the cold, and its agriculture may be described as somewhat quiescent. The mistakes made in the past management of the soil are those usually seen in newly settled countries where rough and ready methods are inevitable, but now these errors are being realized, and the attention of many is being directed to soil improvement. A useful study is obtained by comparing the rotation practised on similar soils in Wales, the south of Scotland, and in the New England States of the United States of America, where, as the result of long experience, an eight-course rotation has been arrived at, usually on these lines. First, a cereal crop, followed by a root crop,

and then a second cereal, and, lastly, the land is seeded to grass and used as a pasture for five years. During the pasture period the land is storing up humus to be used during the cropping period of the rotation, and the grass is well manured with farm-yard manure obtained from feeding roots and meadow hay to the live stock. It seems that, with some modification, a rotation on these lines is needed in this district, and it is already being carried out by a few farmers thus: After the grass land is broken up at the end of winter, it is fallowed and worked up to kill Twitch and weeds and made ready for an Algerian oat crop sown in March. Should the land be clean, a crop of summer rape is often put in after the first ploughing, and on being fed off by sheep this is ploughed in and the first cereal crop sown in autumn. After this first cereal crop, a crop of rape is taken in the following summer, and then the second cereal crop is sown. When this latter is harvested and sheep have foraged the stubbles, the land is disked and rolled and sown down with mixed grasses and clovers and rolled again. On low ground Perennial Rye grass does best, whereas Cocksfoot prefers the high ground. To make a good bottom sole of turf 1 lb. of tested Dogstail per acre along with Cowgrass, Alsike, and White clovers does best. Of the other grasses, various Fescues have been tried, and though they grow, they are not in much favour, and hitherto attempts to make a permanent stand of Timothy have consistently failed. Why this valuable grass should not succeed here is hard to explain, but the grass comes up the first season and then gradually dies out. Perhaps this is due to insufficient nitrogen. Creeping, Bent and Fog grasses sooner or later enter the pastures of themselves, but top-dressing with plenty of sulphate of lime keeps them in check. Kentucky Blue grass will grow, but its roots form a twitch, and Prairie grass does so well that it is soon eaten out and gets little chance of seeding. The cereal, rape, and grass crops need to be sown with plenty of phosphate, and it will be found that in all the crops there will be a spontaneous growth of cluster clover and yellow trefoil, which adds to the feeding value of the crops and puts nitrogen into the soil. After five years in grass the land is again broken up and the rotation repeated.

There is, however, one weak point in the above method, for after the first cereal crop the land lies in stubble during the following winter before sowing the rape, when what nitrogen that may be present is being leached out by the rain. This can be remedied by disking and rolling the stubble in February and drilling early in March a mixture of 1 bushel (20 lbs.), of Italian Rye grass and 10 lbs. of Red clover (not Cowgrass) or Crimson clover (*Trifolium incarnatum*). The clover can be mixed with basic phosphate and sown through the manure runs of the drill, while the grass seed can go through the wheat runs, setting the drill as if to sow 40 lbs. of wheat. The tubes are taken out of the boots of the drill hoes or coulters and allowed to swing loosely, and a chain harrow is hitched behind the drill to cover the seed, which is rolled again and left. This grass and these clovers are annuals, and vigorous growers, and make splendid meadow hay which is an almost perfectly balanced ration for milking cows, though Crimson clover is not suitable for horses. Italian Rye grass seed to-day costs 9s. 6d. per bushel, and Red and Crimson clover each 1s. 3d. per lb.; therefore the cost per acre for putting in should work out thus:—Seed, 22s.; basic

phosphate (one bag), 186 lbs., 10s.; disking, 2s. 10d.; rolling twice, 2s. 6d.; drilling, 2s. 4d.; total, £1 19s. 8d. Mowing will cost per acre, 1s. 10d.; raking, 1s. 4d.; carting and stacking, say, 3s., making a grand total for putting in and taking off of £2 5s. 10d. Assuming the yield to be only 30 cwt. per acre, then this brings the cost of this fodder at £1 10s. 7d. per ton, which is cheaper than oaten chaff. Then there is the value of the farm-yard manure to be deducted after eating this hay, and the unearned increment in the way of nitrogen put into the land by means of the clover, and the feeding value of the aftermath before the land is broken up for the second cereal crop. This grass is only intended for a one year's lea, and it is for the purpose of keeping the land occupied in winter to save nitrogen, the nitrogen formed by the clover being packed round its roots where rain cannot harm it.

The following is a good rotation on potato land: After the lea is broken up at the end of winter and worked up deeply and fine by November, all the available farm-yard manure is spread just before planting the potatoes. It is a common practice here to drop a little phosphate on each seed potato by hand in the furrow before covering with the plough, and the amount thus applied works out at one and a half bags, or 279 lbs., per acre. However, it is easier to drill the phosphate on the land before planting, and so diffuse the manure more through the soil. When the potatoes are dug, say, in May, after raking away the haulms and ploughing, at once drill in White oats or barley with phosphate. When that is harvested, sow in March Italian Rye grass and Crimson clover as above described; when this is mown and stacked and the aftermath eaten out by sheep, the land will be ready for a crop of Algerian oats. When the oat crop is harvested, the paddock can be sown with 1 bushel of Perennial Rye grass and 8 lbs. of Cowgrass clover, which will remain in the ground for four years. To make the clover last well, it needs a top-dressing yearly with one bag of basic phosphate per acre, and this will give splendid hay for winter feed. After mowing, there is a good aftermath, and in some seasons a second cutting will be obtained, in which case, however, there will be little after-growth. At the end of the four years the land will be ready for potatoes again. During the grass and clover period the humus will increase in depth. In one paddock treated this way where the humus to start with was only 3 inches deep, at the end of four years when the plough was set to cut a furrow 8 inches deep for the potato crop, no subsoil was turned up. In following this plan of rotation on potato land, practically nine bags, or 1,674 lbs., of basic phosphate will be applied per acre, or less than ¼ lb. per square yard, which is not much when spread over a period of eight years, but it makes all the difference to the fertility of the soil and the quality and quantity of crops grown. Making a change in the variety of clover grown, by using Crimson clover at one time and Cowgrass at another, obviates the risk of clover sickness appearing, but this disease so far has not been seen here. Should it appear in the Cowgrass, then Alsike clover might be substituted alternately with the latter in the final four years of the rotation.

This country is capable of great production, its grazing is sound, for fluke is rare and foot rot practically unknown, and the bracing climate is the best for developing vigour in all animal life, that of man included, but farming here must advance rather on lines followed in the

South Island of New Zealand, where provision has to be made for providing food for the farm live stock during each winter, and not so much for the droughts which hang like the sword of Damocles over the heads of farmers in the North. Many of the farms are under-capitalized, but when that capital is concentrated on smaller areas the land will be made to yield more, and its fertility must increase.

GOVERNMENT CERTIFICATION OF STANDARD COWS.

Conducted under the Direction of the Honorable the Minister for Agriculture for the Encouragement of the Dairying Industry of Victoria by the Up-building of Profitable Herds.

Regulations.

Entry.

1. (*a*) The owner of any herd of pure bred dairy cattle may apply for entry of his herd in the test.

(*b*) Only those cows will be accepted for test which are registered, or have been accepted for registration, in a recognised herd book or pure stock register.

(*c*) All cows in the herd must be tested, with such exemptions only as are set out in clause 8.

(*d*) Any cow entered for test and any calf the progeny of such cow must be branded in such manner as to insure identification, if the Chief Veterinary Inspector of the Department of Agriculture so directs.

Fees.

2. Each herd owner shall pay to the Department of Agriculture, on entry of his herd, and annually thereafter, a herd entry fee of £2, together with a fee of 10s., repayable at each lactation period, for each cow submitted to test. Provided that, in respect of a herd owned solely by a returned soldier, and being his *bonâ fide* property, during the first five years the herd is under test, and no longer, the fees chargeable shall be one-half of the amounts above specified—that is, a herd entry fee of £1 payable on entry and annually thereafter, and a fee of 5s. per cow, payable on entry and repayable at each lactation period.

Lactation Period.

3. Testing and recording shall occupy a period of 273 days, commencing one week from date of calving, excepting under such circumstances as are set forth in clause 8 of these regulations. This period shall be recognised as the official lactation period. In the event of a cow aborting, the lactation period shall thereupon terminate. If the testing of any cow be discontinued by an owner, without a reason deemed to be sufficient, during a lactation period, and before it has qualified for a certificate, such cow shall, in the published report, be included in the number of those which have failed to qualify for a certificate.

Recording.

4. The milk from each cow under test shall be weighed separately immediately after each milking by means of tested and approved scales, and the weight shall be recorded at the time on a printed chart supplied for the purpose by the Department of Agriculture, and which shall remain the property of the Department. Such weighing and recording shall be carried out at the milking shed, and the scales and chart shall be available for inspection by a Government Dairy Supervisor when required. During the process of drying off a cow no weight of milk under 4 lbs. per day shall be credited to the same.

Supervision and Testing.

5. (*a*) A Government Dairy Supervisor or Herd Tester under the direction of the Chief Veterinary Inspector, will make periodical visits for the purpose of checking records and taking samples of milk for testing. There shall be not less than nine visits during the official lactation period, and these visits shall as far as practicable be at intervals of not more than 30 days. Additional visits may be made by a Supervisor or Tester for the purpose of taking supplementary records and samples for testing at any time, and as often as may be deemed advisable.

(*b*) Every facility shall be afforded Government officers in carrying out their duties under these regulations and accommodation for them must be provided over night when required.

(*c*) Particulars as to date of calving, service, drying-off, hours of milking, and manner of feeding, must be furnished on the request of the Chief Veterinary Inspector or visiting Dairy Supervisor or Herd Tester. If deemed necessary in any case an owner may be called upon to furnish a statutory declaration as to the correctness of such or any particulars.

(*d*) In collecting samples for testing, samples of each milking will be taken separately; the tests will be made by the Chemist for Agriculture or his deputy from such samples, and the results, unless considered abnormal, shall be considered as the average for the period intervening since the next previous normal test. If abnormal the results may be discarded, and further samples taken and tests made.

(*e*) Should an owner's records of daily milk yields not be corroborated by the check weights obtained by a Supervisor or Tester the Chief Veterinary Inspector may, after affording the owner an opportunity for explaining such variation, discard the owner's records and allot an average based upon the officer's check weights immediately preceding the period in question and those at the conclusion of such period.

Standard Cows.

6. (1) Standard cows under these regulations shall be those which, during the official lactation period, yield—

(*a*) in the case of cows commencing their first lactation period and being then under three years of age, 175 lbs. of butter fat;

(*b*) in the case of cows commencing their first lactation period and being then over three years of age, 200 lbs. of butter fat;

(*c*) in the case of cows commencing their second lactation period and being then under four years of age, 200 lbs. of butter fat.

(*d*) in the case of cows commencing their third or any subsequent lactation period or being over four years of age. 250 lbs. of butter fat.

(2) A standard cow shall be tattooed with the official crown, and a number allotted by the Chief Veterinary Inspector.

Certification.

(*a*) A Government certificate will be issued on the owner's application in respect of every standard cow, and such certificate shall include the following particulars, viz.:—Breed, age at entry, brands and marks (including the official tattoo), official lactation period, date of completion of test, weight of milk recorded, the amount of butter fat and commercial butter (estimated on a 14 per cent. over-run), and the weight of milk yielded on the last day of the official lactation period.

(*b*) A certificate issued in respect of any standard cow shall, if she attains the standard during any subsequent official lactation period be returned to the Chief Veterinary Inspector for the indorsement thereon of the results of each such successive lactation period.

Exemptions and Disqualifications.

(8) Exemptions from test may be granted by the Chief Veterinary Inspector in respect of cows which come within the following category:—

(*a*) Cows which are ten years of age or over at the time of entry of the herd.

(*b*) Cows eight years old or over the yields of which have been recorded for three official lactation periods.

(*c*) Cows affected by injury or sickness, including abortion, which in the opinion of the Supervisor or Tester, confirmed by the Chief Veterinary Inspector, seriously impairs such cows' capacity for milk production.

(*d*) Any cow which on examination is found to be affected with tuberculosis shall be withdrawn from the test, and such cow's milk shall not be allowed to be used for sale, or for the preparation of any dairy produce for sale.

(*e*) Any cow which, on examination, is found to be affected with actinomycosis of the udder, or any other disease or condition which may temporarily render her milk injurious, may remain in the herd for testing, but her milk shall not be used for sale or for the preparation of any dairy produce for sale without permission of the Chief Veterinary Inspector.

(*f*) When any newly-calved cow is rendered temporarily unfit for testing by being affected with milk fever, mammitis, retention of placenta, or other ailment affecting newly-calved cows, the period elapsing between the calving and

entrance to the official lactation period may be extended on the recommendation of a Veterinary Officer or Supervisor, but such period shall not exceed one month from date of calving.

(*g*) Should the owner of any herd entered not conform to these regulations, such herd shall be subject to disqualification for such period as the Minister may determine. The Minister retains the right to withdraw any certificate when good and sufficient cause is shown.

INTERPRETATIONS.

9. Any interpretation or decision in respect of these regulations, or in respect of any matter concernign the certification, which receives the written approval of the Director of Agriculture, shall be final.

LOSS OF BUTTER-FAT IN THE MAKING OF CHEESE.

By G. C. Sawers, Cheese Expert.

If rich, yellow cheese is to be produced, it is essential that but the smallest percentage of fat possible be lost from the milk. The chief causes of undue loss of fat in the making of cheese are:—(1) The milk being too sweet; (2) the setting temperature being too low; (3) use of insufficient rennet; (4) allowing the curd to get cold; (5) failure to handle the curd gently, with the consequence that much fat escapes in the whey; and (6) faulty pressing.

Unless the milk is sufficiently acidified at a suitable temperature, and coagulated with the correct amount of rennet for the particular kind of cheese desired, the result will be a soft curd, which readily parts with its fat.

It is generally necessary to ripen, *i.e.*, to acidify, the milk by the judicious use of a lactic acid starter, and the milk should always be tested for acidity before any rennet is added.

The curd must be cut very carefully and afterwards stirred gently; it is during this operation that much fat is often lost.

In cold weather precautions must be taken to prevent the curd getting chilled; if this occurs the development of acidity will cease, and the curd assume a soft, sweet state, instead of ripening normally. During cold weather, therefore, it is an advantage to slightly increase the renneting temperature degree of acidity.

Frequently fat is lost during the pressing period from a curd which is too soft. For all kinds of cheese the pressure should be applied very lightly at first, and gradually increased so that the maximum will be reached late at night. The application of pressure too soon will inevitably mean a big loss of fat.

In the case of a curd being rather softer or more tender than should be the case less pressure should be given; if the curd be hard, then a greater pressure will be required.

STALLION REGISTER 1922-23

under the "Horse Breeding Act 1919."

Part II.—Registrations from 12th July, 1922, to 16th August, 1922.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1052	Abbey	A	Light	H. J. Blackie	Ararat
850	Abbey Mac	A	,,	T. Shearwood	Dooen
1053	Abbot's Best	A	Draught	Jas. Egan	Barwite
1121	Abbotsford II.	4	,,	D. H. Adams	Elmore
1054	Aberdeen	A	Thoroughbred	S. W. Podger	Camperdown
1043	Admiral Howard	A	Draught	W. G. Holland	Sheep Hills
1163	Agitator's Heir	A	,,	G. R. Aurisch	Harkaway
666	Aitken Lad	4	,,	Blair and Robson	Melbourne
1164	Alister	A	Light	J. Williamson	Newry
968	Allan Stewart	3	Draught	A. Gillis	Newmarket
851	All Green	A	Thoroughbred	R. Biggar	Waaia
990	All Nations Glory	3	Draught	G. Raynes	Traynor's Lagoon
1055	All Tricks	A	Light	Mrs. J. C. Millard	Condah
1165	Almost	A	,,	D. Lang	Tungamah
775	Amanus	A	Thoroughbred	A. and J. H. Young	Blackheath
820	Anchorite II.	A	Pony	Thos. Clarke	Cohuna
1056	Aristocrat	A	Light	R. Price	Wallacedale South
1122	Ash Voyage	3	,,	Jas. Guthrie	Shepparton
1058	Assembler	A	Pony	N. Ellis	Ballarat East
691	Bando	8	Draught	Sharp and Taylor	South Melbourne
826	Banker Again	3	,,	W. H. Penno	Boort
1059	Barbour 2nd	A	,,	R. G. Holmes	Jil Jil
827	Baritone	4	,,	E. McKoy	Wodonga
852	Barney	A	,,	L. W. J. Hyland	Benalla
1123	Baron	4	,,	W. Maguire	Barwidgee Settlement
1191	,, Athol	3	,,	A. Colvin	Nathalia
692	,, Blaze	3	,,	C. C. Mengler	Linga
853	,, Brae	6	,,	S. H. Wilson	Katamatite
776	,, Bute	A	,,	Rootes Bros.	West Wyalong, N.S.W.
991	,, Clover	2	,,	W. H. Gillett	Lara
828	,, Clydeside	4	,,	W. H. Penno	Boort
1190	,, Crawford	4	,,	L. J. King	Quambatook
667	,, Douglas	5	,,	John Petrie	St. Arnaud North
1192	,, Duke	3	,,	A. Colvin	Nathalia
668	,, Edendale	3	,,	H. Watkins	Euroa
992	,, Fashion	3	,,	T. J. Opie	Deer Park
732	,, Jock	4	,,	Mal. Lynch	Hopetoun
669	,, McDonald	3	,,	Blair and Robson	Melbourne
777	,, McLean	A	,,	D. W. Stewart	Logan
730	,, May	5	,,	H. W. Oberin	Goornong
854	,, Minto	A	,,	Wm. Hermiston	Mansfield

* For registrations prior to 12th July, 1922, see *Journal* for October.

STALLION REGISTER, PART II., 1922–23—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
993	Baron Rosebery ..	5	Draught ..	Wm. Allen ..	Junortown
733	,, Silk ..	4	,, ..	J. H. Meyer ..	Kaniva
693	Baron's Premier ..	3	,, ..	Blair and Robson	Melbourne
829	,, Prince ..	3	,, ..	F. Bidgood ..	Staghorn
694	,, Stanley ..	4	,, ..	W. A. Wright ..	St. Arnaud
778	,, Superior ..	A	,, ..	W. Bransgrove ..	Neerim North
1101	Basil B.	A	Light ..	W. A. Riedell ..	Tongala
855	Bell Boy	A	,, ..	A. G. Turnbull ..	Horsham
994	,, ,, Voyage ..	5	,, ..	K. N. McKay ..	Mitiamo
1166	Belmain	A	Draught ..	D. Lang ..	Tungamah
1124	Belmont Again ..	5	,, ..	W. A. Creighton	Alexandra
734	Ben Model ..	4	,, ..	H. Adams ..	Yaapeet
779	Berra Bach ..	A	Pony ..	J. Bryce ..	Mitchell's Hill
857	Bickie	A	Light ..	A. G. Turnbull ..	Horsham
1125	Bill Orange ..	2	Thoroughbred	W. J. Everett ..	Tongala
1193	Billy Mac	A	Light ..	W. Calaby ..	Ararat
1126	Black Shepherd ..	4	Draught ..	G. Simpson ..	Tongala
995	,, Voyage ..	3	Light ..	J. Penno ..	Marong
830	Blue Trout ..	A	Thoroughbred	Walker and Quinn	Swan Hill
695	,, Wren ..	A	Light ..	C. Lang ..	Carisbrook
1167	Bob Ash	A	,, ..	Thos. Moore ..	Kialla East
736	Bobbie	4	Pony ..	I. E. Barratt ..	Traynor's Lagoon
858	Bogandyera ..	A	Thoroughbred	J. Hargreaves ..	Dederang
671	Bold Arthur ..	3	Draught ..	Jas. Galloway ..	Majorca
849	,, Donald ..	3	,, ..	J. J. Vite ..	Moorwatha, N.S.W.
696	,, Dundonald ..	3	,, ..	A. McKinnon ..	Walpeup
672	,, Elderslie ..	3	,, ..	Blair and Robson	Melbourne
978	,, Fenwick ..	3	,, ..	W. J. Pethick ..	Adelaide, S.A.
831	,, McGregor ..	3	,, ..	W. H. Penno ..	Boort
1168	,, Newton ..	A	,, ..	J. R. Mitchell ..	Sandford
737	,, Orbost ..	3	,, ..	F. G. Allen and Sons	Broughton
996	Bonnie	5	Pony ..	W. Chynoweth ..	Swan Hill
832	,, Abbot ..	3	Draught ..	H. P. McDougall	Bundalong
1127	,, Baron ..	3	,, ..	T. F. Pickens ..	Kotta
1060	,, Belmont ..	A	,, ..	W. Williams ..	Corrins L. B.
673	,, Knight ..	3	,, ..	Gerrard Bros. ..	Mangalore West
674	,, Ronald ..	3	,, ..	Blair and Robson	Melbourne
1057	,, Scotchman ..	A	,, ..	R. Price ..	S.S. Wallace-dale South
1194	Brassey's Pride ..	A	Pony ..	A. E. Millar ..	Hopevale
860	Breedon Pioneer ..	A	Draught ..	M. C. Ryan	Chetwynd
871	Breeze	A	Light ..	T. Ryan ..	Tatura
780	Brigham Again ..	A	Pony ..	J. Burns ..	Euroa
877	Bright Lad	3	,, ..	F. A. J. Pahl ..	Murrayville
697	Bristol	4	Draught ..	John Jones ..	Bet Bet
984	British Admiral ..	A	,, ..	W. Sheehan ..	South Muckle-ford
1044	Briton	A	,, ..	P. Peterson ..	Cravensville
1169	,, Again ..	A	,, ..	T. Fitzgerald ..	Rutherglen
1036	Briton's Pride ..	A	,, ..	A. Cameron ..	Karnak
783	Brooklyn Junior ..	A	Light ..	M. Lynch, junr.	Dunbulbalane
1195	Brown Lad ..	A	Draught ..	T. Foley ..	Birchip
833	Call Boy	A	Thoroughbred	G. A. Osborne ..	Wodonga West
784	Calland Dale ..	A	Draught ..	J. E. Hooper ..	Devenish

STALLION REGISTER, PART II., 1922–23—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
835	Canny	5	Thoroughbred	T. A. Griffiths ..	Glenrowan
824	Captain Douglas ..	3	Draught ..	C. S. Rodda ..	Warracknabeal
785	,, Llewellyn ..	A	Light ..	H. Bullock ..	Hamilton
786	Carolyn	A	Draught ..	J. R. Peachey ..	Darlingford
1062	Carovita	A	Pony ..	J. Clark ..	Cowwarr
698	Cedric Dale ..	3	Draught ..	P. O. H. Thomas	Walpeup
1116	,, Hero ..	4	,, ..	Harditta Singh	Pier Millan
787	Cedric's Son ..	A	,, ..	D. Caldow ..	Piangil
1063	Charlie II. ..	A	,, ..	C. E. Warren ..	Narioka
675	Cherry Farm Standard	4	,, ..	Dyke Bros. ..	Gre Gre Village
970	Cheviot	A	Light ..	M. Zimmer ..	Epping
731	Child Abdallah ..	A	,, ..	R. Beyer ..	Seddon
977	Clan Newton ..	6	Draught ..	Bailey Bros. ..	Glenrowan
861	Clarendon II. ..	A	Pony ..	C. Underwood	Timboon
738	Claymore Junior ..	2	,, ..	J. P. Hanrahan	Ballan
1064	Clem	A	,, ..	M. Skeyhill ..	Weerite
1118	Cleve Todd ..	4	Light ..	T. A. Hardwick	North Essendon
782	Cole's Pride ..	3	Draught ..	W. J. Pethick ..	Adelaide, South Australia
1066	Colonel Young ..	A	,, ..	W. H. Twigg ..	Janiember
841	Commonweal ..	A	,, ..	W. C. Holt ..	Foster
699	Conqueror.. ..	3	,, ..	D. and M. McKinnon	Beazley's Bridge
1128	Coupar's Best ..	3	,, ..	Baxter Bros. ..	North Mooroopna
1013	Craigie Masterstroke	A	,, ..	F. S. Falkiner and Sons	Boonoke North, N.S.W.
1067	Cronje Wilkes ..	A	Light ..	G. B. Mackie ..	Camperdown
1170	Cutty Sark ..	A	Pony ..	L. Dureau ..	Woodford
862	Cyanide	A	,, ..	A. Sutherland ..	Welshpool
1171	Cymro Bach ..	A	,, ..	B. Rudduck ..	Melbourne
985	Dale's Pride ..	3	Draught ..	W. P. McCahon	Cope Cope
700	Dalbora	4	,, ..	W. Bunworth ..	Watchupga
741	Dalmore Pride ..	3	,, ..	Massa Singh ..	Pier Millan
739	Dalmore's King ..	2	,, ..	J. G. Bunworth	Donald
701	,, Pride ..	4	,, ..	R. G. Hynam ..	Patchewallock
989	Dancing Bell ..	A	Light ..	W. C. Marshall ..	Beremboke
742	Dandenong ..	4	Pony ..	R. C. Ladlow ..	Dooen North
863	Dandy Again ..	A	Pony ..	A. Cameron ..	Warracknabeal
788	,, ,, ..	A	,, ..	R. Lawler ..	Ouyen
997	,, Direct ..	4	Light ..	Wilkinson and Graves	Manangatang
1068	,, Jim ..	A	Pony ..	E. McDonald ..	Tangambalanga
1069	,, Nut ..	A	,, ..	E. Small ..	San Remo
998	,, Premier ..	4	Draught ..	R. W. Zirkler ..	Kerang
1196	Dan Patch Junior ..	A	Light ..	J. McCormack ..	Knowsley
864	Defender	A	Draught ..	J. Ballantyne ..	Buln Buln
789	Derby Chimes ..	A	Light ..	H. Saunders ..	Wodonga
836	Direct Alto ..	5	,, ..	G. Howells ..	Bridgewater
999	,, Kola ..	3	,, ..	J. A. Wilson ..	Nyah West
865	,, Lulu ..	A	,, ..	J. F. Mitchell ..	Burrowye
1070	Director	A	Pony ..	Jos. Hurst ..	Kilmore
1034	Don Alto ..	A	Light ..	G. Maxwell ..	Wangaratta
1071	,, Huon ..	A	Pony ..	W. Lyons ..	Drouin
866	,, Olive ..	A	,, ..	A. Cheesley ..	Barnawartha
1162	,, Tourie ..	6	Light ..	J. Dillon ..	Manangatang
702	Donald Dale ..	3	Draught ..	Jas. Frith ..	Torrita

STALLION REGISTER, PART II., 1922–23—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address
		Yrs.			
1000	Donald's Best ..	5	Draught ..	D. Kelly ..	Kunat
790	Dorregal Chief ..	6	,, ..	C. R. McCallum	Pepper's Plains
676	Douglas Chief ..	5	,, ..	Mitchell and O'Brien	Melbourne
677	Douglas' Heir ..	3	,, ..	Blair and Robson	Melbourne
1138	Dreadnought ..	A	,, ..	C. LeLievre ..	Corack East
867	Duke Little Eyes ..	A	,, ..	A. E. Bowman ..	Tallangatta
791	,, of Melton ..	A	Light ..	Hoysted Bros. ..	Wangaratta
839	,, of Winton ..	3	,, ..	W. C. Bain. ..	Winton
1129	,, of Sandmount	4	Draught ..	O. Bassett ..	Sandmount
1197	Dundonald ..	A	,, ..	John Adams ..	Swan Hill
678	Dunure Blend ..	4	,, ..	Hehr Bros. ..	Woolert
792	Eastern Star ..	A	,, ..	D. and G McDonald	Minyip
793	Edgeworth ..	A	Light ..	P. J. White ..	Janiember East
794	Emulator Junior ..	A	Pony ..	J. G. Scott ..	Hopetoun
703	Estelle Junior ..	3	Light ..	D. Green, jun. ..	Nullawil
1130	Everard Bute ..	3	Draught ..	J. G. Bail ..	Kyabram
842	Excel	A	Pony ..	W. C. Holt ..	Foster
679	Fabricate	A	Draught ..	Jas. Maitland ..	"Anama," Hart, N.S.W.
680	Fabric's Heir ..	5	,, ..	Elliott and Dickins	Corowa, N.S.W
1073	Fairfield	A	Light ..	A. Lenon ..	Cohuna
873	Falmouth ..	A	Thoroughbred	W. R. Cullen ..	Wahgunyah
795	Federal Duke ..	A	Draught ..	Jas. Hendry ..	Bridgewood
601	,, Prince ..	A	,, ..	G. M. Vallence ..	Cohuna
837	,, Sail ..	4	,,	J. D. Rhodes ..	Daysdale, N.S.W.
1074	,, Tax ..	A	,, ..	J. T. Williams ..	Tandarra
796	Federation's Pride ..	A	,, ..	G. East ..	Noradjuha
1075	Field Ambulance ..	A	Light ..	F. Manning, sen.	Stratford
801	Fire Bells	3	,, ..	J. McFarlane ..	Yarraville
797	First Gratton ..	5	,, ..	J. Chisholm ..	Dandenong
781	Flash Cole ..	3	Draught ..	W. J. Pethick ..	Adelaide, S.A.
802	,, Dale ..	2	,, ..	P. Bagnell ..	Mologa
874	,, Dillon ..	A	Light ..	P. Shelton ..	Mordialloc
979	Flower of Moray ..	3	Draught ..	S. J. Allen ..	Nhill
803	Flying Possum ..	5	Pony ..	H. E. Wood and Sons	Mooroopna
804	Foamy Voyage ..	4	Light ..	A. V. Mahar ..	Kerang
838	Freedom Huon ..	6	,, ..	Sullivan and Sons	North Melbourne
603	Garnet	6	,, ..	J. J. Carmody ..	Leongatha
1172	Gay Gordon ..	A	Pony ..	J. R. Mitchell ..	Sandford
604	,, Lad	A	Draught ..	J. Archibald ..	Sale
875	,, Voyage ..	A	Light ..	P. A. Beaumont	Ouyen
704	General Brigham ..	3	Pony ..	N. Gillis ..	Maryborough
1037	,, Kitchener ..	A	Draught ..	D. N. Marshman	Beulah
798	,, R. ..	A	Light ..	L. Welch ..	Gapsted
743	,, Scotch ..	5	Draught ..	J. McIntyre ..	Minyip
681	,, Wallace ..	4	,, ..	J. T. Bartlett ..	Barnawartha
1131	George Wilks ..	3	Light ..	H. D. Adams ..	Kotupna
651	Gillies Son ..	A	Draught ..	Boyd Bros. ..	Koroit
876	Ginger	A	Light ..	D. McLean ..	Chiltern
1076	Giru	A	Thoroughbred	Brig.-Gen. W. J. Clark	Sunbury
799	Gisborne	A	Draught ..	E. Scott ..	Daytrap North

STALLION REGISTER, PART II., 1922-23—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
605	Gladiator	A	Draught ..	H. Jeitz ..	Rainbow
705	Glen Arthur ..	5	,, ..	C. T. Henderson ..	Weatherboard
744	,, ,, ..	4	,, ..	A. Arnold ..	Werrigar East
706	,, Direct ..	3	Light ..	P. Whitechurch	Mildura
976	Glendale	4	Draught ..	E. Wright and Sons	Officer
606	Glenmooney ..	6	Light ..	G. H. Palfrey ..	Campbellfield
805	Glenmore	4	Draught ..	A. Colvin ..	Nathalia
609	Glenorchy ..	A	,, ..	H. Hance ..	Lang Lang
610	Glenspean ..	A	Thoroughbred	A. Cameron ..	Warracknabeal
878	Gnarpost ..	6	Light ..	P. B. O'Keefe ..	Rutherglen
745	Gobbler	5	Draught ..	A. Knight ..	Lake Bolac
1077	Golden Action ..	A	Light ..	W. Watts ..	Kamarooka
1173	Gold Tuck ..	A	Thoroughbred	J. J. G. Barns ..	Euroa
746	Grampian Lad ..	3	Draught ..	A. Richards ..	Gymbowen
800	Grattan Bells ..	A	Light ..	T. Shearwood ..	Dooen North
1132	Guy Fox	5	,, ..	H. Maddison ..	Mongan's Bridge
946	Hamilton Emulator Junior	A	Pony ..	Todd Bros. ..	Willenabrina North
1078	,, Hero ..	A	Draught ..	A. Booley ..	Banyan
901	Hamiltonian ..	A	,, ..	A. Steele ..	Woomelang
611	Happy Bells ..	A	Light ..	W. H. Bell ..	Bowser
902	Harold A... ..	A	,, ..	R. M. Smith ..	Landsborough
1038	,, Direct ..	A	,, ..	Joseph Glenn ..	Tylden
879	,, Wilkes ..	A	,, ..	Mrs. P. Shipp ..	Richmond
880	Harvest Again ..	A	,, ..	J. K. Shepherd ..	Ouyen
881	Havoc	A	,, ..	T. S. Cook ..	Willaura
612	Here's Luck ..	A	Pony	C. J. Anderson ..	Tarranyurk
613	Hero	A	Draught ..	J. Carruthers ..	Picola West
882	,, ...	A	Pony ..	T. Park ..	Wonthaggi North
1174	,, Laddie ..	A	Draught ..	H. F. Robinson	Kerang
1079	Herward Junior ..	A	Light ..	J. A. Haebich ..	Bittern
903	High Commander ..	A	Draught ..	Griffiths Bros. ..	Greta West
773	,, Commissioner..	5	,, ..	H. Graham ..	Melbourne
823	Highland Chief ..	3	,, ..	E. E. D. White ..	Charters Towers, Qld.
807	,, King ..	4	,, ..	Blair and Robson	Melbourne
904	His Majesty ..	A	,, ..	M. Frawley ..	Leigh Creek
1080	Hivites	A	Thoroughbred	F. N. Heywood	Toongabbie
1198	Holdup	A	Light ..	A. B. Burns ..	Rainbow
905	Honest Cleve ..	A	,, ..	W. Eichler ..	Chillingollah
707	Huon's Joy ..	4	Pony ..	C. S. Wade ..	Bronzewing
1175	I Am Here ..	A	,, ..	A. T. Ingram ..	Orbost
1081	Ian Dhu	A	Light ..	N. C. Gibson ..	Joel South
883	,, McClelland ..	A	Draught ..	H. Naylor ..	Roseberry East
1133	Inverurie ..	2	,, ..	Baker Bros. ..	Rushworth
614	Interest	A	Pony ..	A. Kennedy ..	Arcadia ..
615	Jack Huon ..	A	Light ..	F. G. Ronalds ..	Buninyong
907	,, Style ..	A	,, ..	P. McEntee ..	Cudgee
1134	,, Tar	3	Draught ..	J. C. Dufty ..	Lorquon West
1051	Jimmy Direct ..	4	Light ..	J. Isaac ..	Inglewood
884	,, Lea ..	A	,, ..	W. Bradshaw, sen.	Skipton
908	Karamu Glenmarkie	A	Draught ..	J. J. Owens ..	Gannawarra
988	Kelly	5	Pony	G. F. Schache ..	Jung North
708	Kelmscott II. ..	5	Draught ..	A. W. Lackman ..	Murrayville

STALLION REGISTER, PART II., 1922–23—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
909	Kelm's Pride ..	A	Draught ..	J. Dugdale ..	Myrniong
709	Kelvin	2	,, ..	D. and M. McKinnon	Beazley's Bridge
616	Kemp Daly ..	A	Light ..	G. H. Minns ..	Melton
885	Ki Ki	A	Pony ..	J. T. Laidlaw ..	Chetwynd
747	Killawney	3	Draught ..	J. E. Oram ..	Marnoo
617	Kilmore	A	,, ..	J. Russell, jun. ..	Orbost
1082	King Albert ..	A	,, ..	T. McKay ..	Malmsbury
910	,, Bally ..	A	Pony ..	H. Lee	Smeaton
1176	,, Bronte ..	A	Light ..	C. Hando ..	Charlton
710	,, Dillon ..	3	,, ..	W. Barker ..	Dunolly
1065	King of Clubs ..	A	Draught ..	M. Skeyhill ..	Weerite
975	,, of the Valley ..	A	,, ..	R. and A. McClelland	Lara
1083	,, Stanley ..	A	,, ..	R. J. Green ..	Lurg
1135	,, Victor ..	3	,, ..	A. Dunning ..	Numurkah
987	King's Own ..	3	,, ..	E. Johns ..	Gama
886	,, Pride ..	A	,, ..	C. Nelson ..	Benalla
618	Kingling	A	Thoroughbred	Thornton and Spring	Edenhope
748	Kingslea	4	Light ..	I. N. Hutcheson	Pullut
911	Knight of the Garter	A	Draught ..	P. McDonald ..	Nagambie
912	Laird O'Gowrie ..	A	,, ..	T. Smith ..	Rushworth
619	Lake King ..	A	Thoroughbred	W. J. Smith ..	Yackandandah
1177	Lanark's Pride ..	A	Draught ..	W. Etherton ..	Yanac
711	Langdale	3	,,	M. Donnellan ..	Jeffcott North
620	Lee Creek Favourite	A	,, ..	Ewart Bros. ..	Dargalong
913	Leo	A	Pony ..	W. T. Sexton ..	Neerim Junction
859	Lilburne Regent ..	A	Draught ..	J. Hargreaves ..	Dederang
914	Little Argyle ..	A	Pony ..	W. H. Lyon ..	Sale
1084	,, Black Pony ..	A	,, ..	Jessie M. Armstrong	Branxholme
840	,, Eumarrah ..	A	,, ..	R. Painter ..	Leaghur
1117	,, Jack Horner ..	A	,, ..	G. H. Curtis ..	Bruthen
1085	,, Mickey ..	A	,, ..	C. Simon ..	Leongatha
887	,, Milton ..	A	Draught ..	Jas. Hives ..	Tempy
621	,, Pos ..	A	Thoroughbred	A. K. Urquhart	Hexham
1119	Llewellyn II. ..	A	Pony ..	M. Fontana ..	Avenel
712	Lonsdale Again ..	2	Draught ..	Dyke Bros. ..	Gre Gre Village
1178	Lord Allan ..	2	,, ..	Vaughan Bros. ..	Nyam
1179	,, Clarrie ..	A	Pony ..	C. C. Dawkins	Lismore
916	,, Glengyle ..	A	Draught ..	W. Linehan ..	Wunghnu
682	,, Lascelles ..	3	,, ..	Sharp and Taylor	South Melbourne
713	,, Nailstone ..	4	,, ..	J. Murphy ..	Murrayville
917	,, Nolan ..	A	Thoroughbred	G. Naylor ..	Rosebery
1086	,, Threave ..	5	Draught ..	T. Thornton ..	Waaia
608	,, Wallace ..	3	,, ..	J. P. Belleville ..	Wallace
922	Lulu's Dandy ..	A	Pony ..	Sir R. T. H. Clarke	Lancefield Junction
918	Lynm Champion II.	A	Draught ..	E. Wilson ..	Leongatha
622	,, Forest Boy ..	A	,, ..	M. Atwood ..	Rosebery
749	Lyndhurst ..	5	,, ..	D. J. McKenzie	Warracknabeal
919	,, II. ..	3	,, ..	A. Arnold ..	Warracknabeal
771	Lyntourie ..	A	Thoroughbred	L. R. Clarke ..	Newstead
714	Macedon Hero ..	5	Draught ..	P. Williams ..	Riddell's Creek

STALLION REGISTER, PART II., 1922-23—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
888	Mahomet	A	Pony ..	A. Brown ..	Rupanyup
1136	Major Albert ..	4	Draught ..	J. P. Doherty	Rochester
715	,, Clyde ..	4	,, ..	J. J. Gleeson ..	Corack East
623	,, Jock ..	A	,, ..	F. C. Glanville ..	Echuca North
1137	,, Mark ..	3	,, ..	C. H. Feldtman ..	Major Plains
716	Malleepecker ..	3	Thoroughbred	A. T. Finch ..	Speed
1087	Marathon ..	A	Pony ..	J. G. Stewart ..	Hamilton
740	Marcellus II. ..	2	Draught ..	J. Bunge and Sons	Sheep Hills
889	Maringa	A	Light ..	E. Collins ..	Dunkeld
920	Markhope ..	A	Thoroughbred	Trustees Rupert J. Clarke	Lancefield Junction
923	Marshal Clyde ..	A	Draught ..	Jas. Nunn ..	Birchip
624	Master Brigham ..	A	Pony ..	A. E. Harding ..	Whorouly South
890	,, Vengeance ..	A	Light ..	W. Bradshaw ..	Skipton
1023	Mauritius	A	,, ..	J. B. Zander ..	Melbourne
750	McAgain	4	Draught ..	W. G. Burns ..	Goroke
683	McIvor	4	,, ..	Blair and Robson	Melbourne
891	Merrimu	A	Light ..	G. M. Vallence ..	Cohuna
1139	Merry King ..	A	Pony ..	W. F. Maroney ..	Wangaratta
751	,, Lad ..	3	Draught ..	Thos. Sweeney ..	Boolite
892	,, Oliver ..	A	Thoroughbred	E. R. de Little ..	South Caramut
625	Michael	A	Pony ..	Mrs. Bell ..	Flynn
1088	Mickey	A	,, ..	R. Booley ..	Banyan
924	Middlemarch ..	A	Draught ..	M. J. Egan ..	Charlton
684	Middlerigg Referee ..	3	,, ..	O. Deutscher ..	Murtoa
894	Minstrel	A	Pony ..	D. Begley ..	Colac
949	Model's Fancy ..	A	Draught ..	Hutcheson Bros.	Pine Grove
774	Moeser	5	,, ..	J. Tallent ..	Craigieburn
808	Morocco Sport ..	2	,, ..	C. Hewitt and Sons	Werrigar East
1042	Mountain Chief ..	A	,, ..	J. M. Connelly ..	Birchip
925	,, Palm ..	A	Light ..	J. Stephens ..	Northcote
1047	Moving On ..	3	,, ..	H. Fisher ..	Yaapeet
926	Musket Bells ..	A	,, ..	J. H. Latta ..	Derrinallum
1089	Napar	A	,, ..	E. Tozer ..	Porepunkah
752	Newfields Pride ..	4	Draught ..	J. Martin ..	Aubrey-road
685	Newton Bold ..	3	,, ..	H. Wills and Sons	Perth, W.A.
1090	,, Lad ..	A	,, ..	T. N. Skinner ..	Bordertown
895	Newton's Sensation	A	,, ..	R. Banko ..	Simmies
927	,, Stewart ..	A	,, ..	A. H. Borgelt ..	Tarranginnie
626	,, Style ..	5	,, ..	Currell Bros. ..	Cobden
1140	Niggering	3	Light ..	E. G. Traeger ..	Merbein South
843	Nigger Minstrel ..	5	Thoroughbred	D. W. Heaney ..	Benalla
844	Non Pareil ..	4	Draught ..	W. Geddes ..	Boomahnoo-moonah
1091	Norfolk Swell II. ..	A	,, ..	H. McLean ..	Sale
717	Norman's Pride ..	2	Pony ..	A. Harrington ..	Leigh Creek
753	Northcote ..	2	Draught ..	J. R. Thompson	Myrniong
1141	Novel Print ..	3	Light ..	P. Maher ..	Tatura
754	Nyallo Prince ..	5	,, ..	W. T. McAlpine ..	Hopetoun
928	Oakburn	A	Draught ..	C. A. Roberts ..	Glenalbyn
1092	Oakwood	A	Light ..	Geo. Inglis ..	Tallygaroopna
628	,, Direct ..	6	,, ..	A. McCracken ..	Barry's Reef
929	Onward	A	Draught ..	H. T. Wilson ..	Wodonga
1093	,, Star ..	A	,, ..	J. W. Murchison	Dunbulbalane
896	Orbost Again ..	A	,, ..	G. H. Deckert	Kinimakatka
930	Our Bobby ..	A	Pony ..	W. H. Gardiner	Lurg

STALLION REGISTER, PART II., 1922-23—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
822	Our Guide ..	A	Light ..	Geary Bros. ..	Tungamah
931	Owyhee Chief ..	A	,, ..	J. Shanahan ..	Richmond
1180	O.Y.D.	A	,, ..	P. Lyon ..	Eddington
607	O.Y.K.	A	,, ..	G. H. Palfrey ..	Campbellfield
629	Paccaway ..	A	,, ..	T. H. Clyne ..	Echuca
1142	Palais Danse ..	4	Thoroughbred	D. W. Heaney ..	Benalla
1094	Palos	A	Light ..	R. Warren ..	East Geelong
630	Papakaio	A	Draught ..	A. B. C. Dripps	Nathalia
897	Patrician Pride ..	5	,, ..	W. E. Bryce ..	Traynor's Lagoon
898	Patrobas	A	Thoroughbred	Mrs. Widdis ..	"Nambrok," Rosedale
1095	Peter	A	Light ..	J. Carroll ..	Mudgegonga
932	Petrillott	A	Thoroughbred	R. Barr Smith ..	Willaura
1039	Pettadale	A	Draught ..	N. Ramsay ..	Newbridge
631	Phylactery ..	A	Thoroughbred	A. B. Gibbons ..	Cohuna
632	Pirateer	A	Light ..	D. McArthur ..	Victoria Valley
633	Plumlea	A	,, ..	P. Fischer ..	Jeparit
1001	Pompy	6	Pony ..	E. H. B. Cleeland	Newhaven
1045	Powisland Pure Blood II.	A	Draught ..	W. Bolton ..	Girgarre East
893	Predominate ..	A	Light ..	E. R. de Little ..	South Caramut
1181	Premier Lauder ..	A	Draught ..	P. Kelleher ..	Baddaginnie
1182	,, Ward ..	A	,, ..	J. A. and R. Jobling	Mumbel Plains
1002	Preston	A	Pony ..	E. McEvoy ..	Colbinabbin
933	,, Junior ..	A	Light ..	J. McLure and Son	Drummond
1096	Pretty Bobby ..	A	Pony ..	W. and W. G. Hall	Talbot
1041	Pride	A	,, ..	W. A. Cardwell ..	Tallangatta
634	,, of the Ponds ..	A	Draught ..	E. Drayton ..	Waurn Ponds
772	Prince Alexander II.	A	,, ..	Stokes and Caffrey	Melbourne
1097	,, Benmore ..	A	,, ..	W. D. Starbuck ..	Rupanyup
1098	,, Charles ..	A	Pony ..	J. Dawkins ..	Colac
635	,, Coupar ..	A	Draught ..	L. Clarke ..	Newstead
934	,, Douglas ..	A	Light ..	P. Martin ..	Molesworth
969	,, Edward ..	A	Draught ..	D. King and Sons	Rutherglen
1003	,, Ettrick ..	A	,, ..	A. R. Paynter	Violet Town
1143	,, Hamilton ..	4	,, ..	C. J. Warren ..	Boinka
935	,, Harold ..	A	Pony ..	H. Robertson ..	Wallacedale
1046	,, Henry ..	A	Draught ..	P. Stratton ..	Turriff East
1099	,, Que ..	A	Pony ..	A. E. Callow ..	Ballarat
755	,, Robert ..	3	Draught ..	Theo. Bunge ..	Sheep Hills
756	,, Wigton ..	2	,, ..	P. Shanahan ..	Myrniong
1100	Prince's Ribbon ..	A	Light ..	W. A. Riedell ..	Tongala
1004	Punch	A	Draught ..	E. H. B. Cleeland	Cowes, Phillip Island
936	Quamby ..	A	Pony ..	P. McEntee ..	Cudgee
1144	Quatta's Baron Belmontian	5	Draught ..	R. F. Carmody	Everton
809	Real Scotch ..	5	,, ..	J. Rumbold ..	Laanecoorie
1005	Red Wilkes ..	A	Light ..	E. Rash ..	Ballarat
636	Reform ..	A	,, ..	J. Branson ..	Lake Cooper
1006	Regis	A	Draught ..	E. Manifold ..	Camperdown
1145	Reisorel	4	Light ..	W. G. Parish ..	Horsham
686	Review	3	Draught ..	A. Stewart ..	Donald
638	Rhymney II. ..	A	Pony ..	G. Roberts ..	Goroke

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Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1102	Ribbon Wheel ..	A	Light ..	V. Vaughan ..	Condah
1007	Richard Cleve ..	A	,, ..	G. E. Hodgins ..	Hastings
639	,, III. ..	A	Pony ..	A. Ruttle ..	Inverloch
1199	Rifle Boy	A	,, ..	P. R. Cooke ..	Euroa
757	Ripple Pride ..	3	Draught ..	D. L. Bodey ..	Jung
759	Rising Star ..	4	,, ..	E. Pearse ..	Rupanyup
953	Robert Alto ..	A	Light ..	A. Kennedy ..	Arcadia
810	,, Bruce ..	4	Draught ..	R. C. Gulliver ..	Balldale,N.S.W.
937	Robin Roy ..	A	Light ..	C. Paulin ..	Port Melbourne
650	Rob Shanter ..	A	Pony ..	Boyd Bros. ..	Koroit
1048	Romlad	3	Draught ..	M. Schultz ..	Warracknabeal
811	Roseleigh's Viceroy ..	3	,, ..	Gange Bros. ..	Mininera
812	Roseworthy ..	5	Light ..	C. S. Walker ..	Swan Hill
1008	Rothmont	6	,, ..	J. A. Kirkpatrick	Lismore
646	Roy	A	Pony ..	J. B. Cleeland ..	Newhaven
971	Royal Agitation ..	3	Draught ..	A. Gillis ..	Newmarket
938	,, Bob ..	A	,, ..	J. Parle ..	Carwarp
760	,, Bute ..	4	,, ..	G. Luckie ..	Springhurst
1146	,, Charm ..	3	,, ..	J. R. Stokes ..	Abbotsford
983	,, Comedy ..	5	Thoroughbred	A. Sutherland ..	Welshpool
1147	,, Craig ..	4	Draught ..	D. Trewick ..	Elmore
1009	,, Douglas ..	A	,, ..	T. Thornton ..	Waaia
1183	,, Escort ..	A	,, ..	T. Casson ..	Pinnaroo, S.A.
939	,, Flush ..	A	,, ..	M. Colton ..	Terang
1010	,, Gartley ..	A	,, ..	C. P. Butler ..	Warracknabeal
846	,, Hero ..	4	,, ..	J. Hoban ..	Alexandra
1011	,, Lad ..	A	,, ..	R. Martin ..	Navarre
718	,, McGregor ..	4	,, ..	Vallance Bros. ..	Nullawil
1148	,, Main ..	3	,, ..	A. J. Trevaskis ..	Murchison
813	,, Rufus ..	5	Light ..	L. Morrison ..	Yarraville
1149	,, Scotty ..	3	Draught ..	S. Fawcett ..	Numurkah
762	,, Seal ..	3	,, ..	J. Dugdale ..	Myrniong
821	,, Sovereign ..	A	Light ..	C. Ridley ..	Northcote
940	,, Standard ..	A	Draught ..	Les Hay ..	Cobram
1012	,, Style ..	A	,, ..	McQueen Bros.	Waubra
1049	,, ,, ..	3	Light ..	Jno. Isaac ..	Inglewood
641	,, Whips ..	A	,, ..	A. J. Walter ..	Warragamba
942	Rufus	A	Thoroughbred	K. Urquhart ..	Hexham
642	R. W. Estell ..	A	Light ..	A. E. Lobb ..	Lamplough
1150	Safe Voyage ..	4	,, ..	D. Murchison ..	Katamatite
814	Sailor Voyage ..	5	,, ..	R. Johnson ..	Bendigo
941	Salient ..	A	Pony ..	L. J. Weatherly ..	Mortlake
643	Sam Huon ..	6	Light ..	J. P. O'Brien ..	East Melbourne
944	Sarsfield	A	Pony ..	C. W. Heaney ..	Kilmore
1103	Satellite Junior ..	A	,, ..	Saunders Bros. ..	Yourang
1151	Satellite's Pride ..	A	Light ..	R. Berry ..	Navarre
644	Scotland's Bloom ..	A	Draught ..	J. K. Shepherd ..	Ouyen
945	,, Viceroy	A	,, ..	Todd and Allen	Willenabrina
763	,, Victory	2	,, ..	J. S. Gray ..	Sheep Hills
764	Scottish Admiral ..	3	,, ..	A. E. Petering ..	Box 53, Minyip
687	,, Fashion ..	A	,, ..	H. Wills and Sons	York, W.A.
974	,, Peer ..	6	,, ..	Tyrell Downs As. P. Coy.	Sea Lake
1104	Scotty	A	,, ..	P. Bagnell ..	Mologa
1105	Seacombe ..	A	Pony ..	E. G. Gibbs ..	Sale
1014	Seldom Seen ..	3	Draught ..	H. B. Lee ..	Clunes
947	Selkirk	A	Light ..	A. Scott ..	Elmore

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		Yrs.			
815	Selsiam	2	Light ..	T. Edson ..	Glenorchy
645	Seymour	A	Draught ..	J. Cleeland ..	Newhaven
816	Shanter's Pride ..	5	,, ..	G. A. Thompson	Kyneton
1015	Shifty Dick ..	A	Light ..	J. T. Neeson ..	Nareen
1050	Signet	5	Draught ..	J. Roberts ..	Kunat
688	Silver Bannerman ..	3	,, ..	Mitchell and O'Brien	Melbourne
948	,, Claim ..	A	Thoroughbred	M. Hutcheson ..	Pine Grove
1040	,, King ..	A	Pony ..	J. Robertson ..	Lake Boga
765	,, Star ..	3	Draught ..	D. L. Bodey ..	Jung
719	Simon Again ..	3	,, ..	G. J. Butler ..	Carisbrook
899	Sir Amyas.. ..	A	Thoroughbred	Mrs. Widdis ..	"Nambrok," Rosedale
647	,, Angle ..	A	Light ..	L. S. Cadman ..	Corryong
982	,, Armadale ..	3	Draught ..	R. and A. McClelland	Lara
648	,, Burnhead ..	A	,, ..	Boyd Bros. ..	Koroit
720	,, Dale	4	,, ..	A. Sands ..	Sea Lake
1016	,, Don Pedro ..	A	,, ..	J. McKee ..	Clarendon
1017	,, Douglas Haig ..	A	,, ..	Mrs. J. Biddlecombe	Shelford
1018	,, George.. ..	6	,, ..	E. J. Griffiths ..	Tongala
652	,, Mac	A	,, ..	W. Blake ..	Rushworth
986	,, Richard 2nd ..	A	Pony ..	W. Henderson ..	Grasmere
1152	,, Robert Newton	5	Draught ..	P. Lawrie, jun.	Rushworth
915	,, Thomas ..	A	,, ..	W. H. Lyon ..	Sale
1106	,, Whyee.. ..	A	Light ..	W. E. Johnstone	Woodford
845	,, William ..	4	Draught ..	McQueen Bros.	Waubra
950	,, ,, ..	A	,, ..	W. A. McClellan	Bungaree
951	Skipper	A	Pony ..	G. Hicks ..	Strathallan
1107	Smart Style ..	6	Light ..	R. Davis ..	Kunat
766	Southern Lad ..	5	Draught ..	G. McKenzie ..	Pullut
1019	Southerton ..	A	Light ..	F. Mason ..	Stawell
654	Splendour ..	A	,, ..	J. McKenna ..	Picola
952	Sportsman's Hero ..	A	Draught ..	A. Kennedy ..	Arcadia
653	Springbank Lawrence	A	,, ..	W. H. Crawford	Hamilton
1154	Squire Belmont ..	3	,, ..	J. M. Phillips	Congupna-road
1108	Standard	A	,, ..	A. Rees ..	Casterton
954	St. Aidan ..	A	Light ..	M. Cribbes ..	Faraday
1109	Standard	6	Draught ..	J. G. Scott ..	Hopetoun
758	Star's Heir ..	3	,, ..	D. L. Bodey ..	Jung
721	Stivious	3	Light ..	A. W. Lackman..	Murrayville
767	Stockman's Lad ..	4	Draught ..	J. F. A. Schulz	Jeparit
722	Stokes' Fancy ..	6	,, ..	L. M. Simon ..	Pinnaroo, S.A.
723	Strathvale ..	3	Pony ..	V. R. Griffin ..	Underbool
689	,, Fancy ..	3	Draught ..	Blair and Robson	Melbourne
1153	Sturdy	5	,, ..	C. T. Burns ..	Tarrita
1155	Sultan	3	Light ..	M. Swan ..	Avenel
1200	Sunbeam	A	Pony ..	D. Ahern ..	Wahring
955	Superior	A	Light ..	D. Tallent ..	Underbool
1020	Taffy	A	Pony ..	T. J. Morrissey ..	Beeac
1021	Take Bells ..	A	Light ..	J. Ferguson ..	Redesdale
956	Tam O'Shanter Bill	A	Pony ..	P. Gordon ..	Ellerslie
1156	Tamie O'Groat ..	4	Draught ..	A. L. Pitts ..	Merrigum
817	Tenor Voyage ..	3	Light ..	F. Siebel ..	Thomastown
1022	Territorial.. ..	A	Draught ..	R. M. Thomas ..	Devon North
973	The Banker ..	3	,, ..	A. Templeton ..	Coleraine

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		Yrs.			
943	The Bard	A	Draught ..	L. J. Weatherly..	Mortlake
957	,, Crown ..	A	,, ..	S. Atwell ..	Rainbow
1184	,, Fashion ..	A	,, ..	R. Dyson ..	Dromana
1024	,, General ..	A	,, ..	J. Lord ..	Boigbeat
563	,, ,, ..	A	,, ..	Wm. Lincoln ..	Portarlington
1025	,, Knight ..	A	,, ..	W. Pharaoh ..	Warragul
1026	,, Macdonald ..	A	,, ..	A. Wohlers ..	Mt. Wallace
1061	,, Masher ..	A	Light ..	W. Williams ..	Strathmerton
825	,, ,, ..	A	Pony ..	W. N. MacNicol..	Casterton
1112	,, Nipper ..	A	,, ..	T. H. Bush ..	Pennyroyal
958	,, Retainer ..	A	Light ..	G. Forrester ..	Curyo
1110	,, Scrip	A	Thoroughbred	H. McInnes ..	Ararat
1035	,, Stewart ..	3	Draught ..	Mitchell and O'Brien	Melbourne
1111	,, Trick ..	A	Light ..	W. Mellington, jun.	Rainbow
872	,, Verger ..	A	,, ..	W. R. Cullen ..	Wahgunyah
655	This Time ..	A	Pony ..	H. Hance ..	Lang Lang
649	Tommy	A	,, ..	Boyd Bros. ..	Koroit
656	,, Alto ..	4	Light ..	J. Boulter ..	Adelaide, S.A.
724	,, Burns ..	4	Draught ..	W. Cook ..	Speed
1185	,, Huon ..	A	Light ..	J. Watkins ..	Euroa
906	Tom Thumb ..	A	Pony ..	W. F. Eichler ..	Chillingollah
657	Tony	A	,, ..	D. J. Kennedy ..	Cobram
658	Towyvale Flyer ..	A	,, ..	W. J. Cadman ..	Thougla
959	Tracey Alto ..	A	Light ..	A. J. Skene ..	Beaufort
868	,, Boy ..	A	,, ..	Turner Bros. ..	Mernda
848	,, Voyage ..	4	,, ..	Mackin Bros. ..	Korong Vale
1027	Tramore	A	Thoroughbred	McDonald Bros.	Mortlake
1186	Tra George ..	A	,,	James and Wall	Leongatha
869	Tresco	A	Light ..	A. E. Bowman ..	Ebden
659	Truro	A	,, ..	J. E. Light ..	Quantong
660	Union	A	Pony ..	W. A. Anderson	Allansford
960	Vanguard ..	A	Draught ..	G. and W. Lord..	Rosedale
1028	Venerror	A	Light ..	J. C. Wallis, sen.	Miram
761	Vice Royal ..	3	Draught ..	Warwick Stud Farm	Swan Hill
856	Viking	A	Light ..	A. G. Turnbull ..	Horsham
1029	Vocal King ..	A	Thoroughbred	A. W. Giddings ..	Sea Lake
1113	Wakepan	A	Light ..	A. W. Johnston	Eldorado
1187	Wallac	A	Thoroughbred	A. C. Mason ..	Shepparton
661	Wee Jim	6	Pony ..	E. R. Pickering	Portarlington
961	Welcome Abbey ..	A	Light ..	W. Haymes ..	Ballarat
662	,, Bells ..	6	,, ..	T. J. Splatt ..	Weering
870	Weralte	A	Pony ..	A. E. Bowman	Ebden
962	Western Lad ..	6	Draught ..	A. Knight ..	Lake Bolac
1157	White Star ..	5	Light ..	Geo. Kelly ..	Powlett Plains
1120	Whiz Bang ..	6	Thoroughbred	J. I. Watson ..	Elsternwick
818	Who's Who ..	4	Pony ..	Sobee and Smith	Melbourne
627	Widgiewa Cavalier ..	A	Draught ..	W. G. Wilkinson	Yarrawonga
981	,, Chief ..	3	,, ..	S. J. Lynn ..	Orbost
1158	,, Edward ..	3	,, ..	W. G. Down ..	Koonda
1159	,, Fashion ..	3	,, ..	J. A. Tweddle ..	Waaia
847	,, Ivo ..	4	,, ..	W. G. Wilkinson	Yarrawonga
1160	,, Marshal ..	3	,, ..	Jno. Christie ..	Katunga
726	,, Sapper ..	5	,, ..	F. J. J. Schultz	Cowangie
963	Wiewood ..	A	Light ..	W. Raftery ..	Shepparton
980	Wigton Again ..	A	Draught ..	C Murphy ..	Oxley

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Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
727	Willie Craig ..	4	Draught ..	G. Oxley, jun. ..	Gre Gre North
690	,, Douglas ..	3	,, ..	Blair and Robson	Melbourne
1030	Winter Wild ..	A	Light ..	F. A. Mitchell ..	East Malvern
964	Wizard Junior ..	A	Pony ..	J. A. Goodwin ..	Wunghnu
965	Wonder	A	,, ..	Wm. McEvoy ..	Alexandra
769	Woodlands Beauty	5	,, ..	E. Fulton ..	Horsham
1161	Yarram	3	Draught ..	W. C. Murray ..	Ballendella
1114	Yorkie II. ..	A	Light ..	G. J. McVean ..	Thougla
1188	Young Albyn ..	A	Draught ..	J. Watkins ..	Euroa
1031	,, Coronation	A	,, ..	W. J. Bennett ..	Cannie
1189	,, Croydon ..	A	,, ..	D. Blair ..	Terrappee
966	,, Estell ..	A	Pony ..	John Falla ..	Donald
819	,, Hamilton Hero	4	Draught ..	Bateson Bros. ..	Cowangie
637	,, Hero ..	A	,, ..	J. Branson ..	Lake Cooper
1032	,, ,, ..	A	Pony ..	F. W. Hender ..	Franklinford
1115	,, Linkwood ..	A	Draught ..	J. H. Peverill	Charlton
663	,, Lord Lyon ..	A	,, ..	N. Chamberlain	Morwell
664	,, Lowrie ..	A	Pony ..	K. McPherson ..	Broadford
1033	,, Major ..	6	Draught ..	C. Gould ..	Tatyoon
728	,, Repeater ..	6	,, ..	R. N. Johns ..	Danyo
967	,, Rysharold ..	A	Pony ..	W. F. Brown ..	Fitzroy
770	,, Shepherd ..	5	Draught ..	G. Chapman ..	Minyip
729	,, Sportsman	4	,, ..	W. Reid ..	Birchip
665	,, Sunbeam ..	A	Pony ..	J. M. Ferris ..	Terrick Terrick

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

SPRAYING.

The spray pump should now be in thorough working order, so that the various spring sprayings may be carried out with as little interruption as possible. It is always wise to clean out the pump after each spraying, so that it will be ready for the next mixture. Putting a different spray in a pump barrel that has not been washed out, very often causes the formation of a sediment, which blocks the nozzle and interrupts the work.

During November it will be necessary to spray for codlin moth, peach aphis, pear slug, and various leaf-eating insects. In addition, black spot of the apple and pear, shot hole, and other fungus diseases must be kept in check. As various sprays are required for all of these troubles, the necessity of always having a clean pump is evident.

At the present time the best spray for peach aphis is strong tobacco solution, and the same spray may also be used for the pear slug. Arsenate of lead is the better spray for this latter insect, but it should not be used when the fruit is approaching the ripening stage; hellebore may also be used for the slug with good effect.

As a preventive against codlin moth, the trees should be kept well sprayed with arsenate of lead. The first spraying should have been given at the time of the falling of the petals; the second spraying, owing to the rapid expansion of the fruit, should be given a fortnight later. After that the grower must use his own judgment as to the necessity for subsequent sprayings. If the moths be at all prevalent, other sprayings will be quickly necessary.

As the woolly aphis is increasing at this time of the year, it will mean a saving of a large number of buds if this insect be sprayed. Nicotine solution, pine spray, or lime sulphur may be used with good effect.

Cultivation.

The work of ploughing and harrowing should be completed immediately. All crops for green manure should be now under cover, and if the orchard soil is at all heavy or stiff, the grower should make up his mind to grow a crop next season, in order that this condition may be reduced.

The orchard should be kept free from weeds, not only for the conservation of moisture, but in order to do away with all hiding places of the Rutherglen fly, cutworm moths, &c.

General Work.

Grafted and newly-planted trees should be frequently examined, and given an occasional watering and overhead spraying, in order to encourage their growth, and to prevent loss of moisture from the foliage. It is also advisable to mulch young trees with light grass, or straw mulching not too rich in animal manure.

The disbudding of unnecessary shoots and the pinching back or stopping of growths, to prevent their becoming unduly long, may now be carried out. This work is particularly important on young trees.

Graft ties should be examined, and the ties cut wherever any growth is being made. Where the grafts are likely to make any long growth, they should be well staked and tied.

Citrus trees may be planted out, and, after planting, they should be watered and mulched.

The Vegetable Garden.

Tomato plants should now receive attention every day; laterals will require pinching back; crowded bunches and shoots should be thinned; the plants should be well tied to the stakes, and liberal supplies of water and manure should be given. One or two more plantings of tomato plants may still be made, so that there may be strong, sturdy plants for the production of late fruits. By planting three or four successions of plants, it is possible to have a good supply of fruits from December to June. Pull up and burn all plants showing any signs of disease.

Celery may now be sown for winter crops. French beans should be largely sown. Cucumber, melon, pumpkin, and all seeds of this family may now be sown in the open.

Where these plants are already growing, the longest and strongest runners may be pinched back, to throw the strength into flowering and lateral growths. Watch the plants for mildew, and use sulphur freely wherever present, especially on the young plants.

Peas, lettuce, radish, turnip, cabbage, and sweet corn seeds may be sown this month. Seedlings from former sowings may be planted out, and it would be well to dip the whole plant in water before planting. This greatly assists the young plants while taking hold of the soil in their new location.

Frequent waterings and frequent cultivation will now be necessary; and all weeds must be hoed or hand-weeded out; mulching with stable manure will greatly assist the plants.

A few beds should now be deeply worked, adding a liberal dressing of stable manure. These plots will then be ready for the celery, cabbage, and other seeds planted during this month.

The Flower Garden.

Continue to plant out the various bedding and foliage plants, corms of gladioli, and seed of such tender annuals as Phlox Drummondi, balsam, zinnia, nasturtium, celosia, aster, cosmos and portulaca.

While seeds planted out in the open germinate and grow fairly well, it is advisable during the summer months to plant these in sheltered seed beds, or in a canvas or calico frame. The protection need be on the one side only, preferably the west or north-west; the seedlings are then protected during the hottest part of the day. At the same time the shading should not be sufficient to unduly "draw" them.

The seeds should not be deeply sown, and all waterings should be light. A little water, often, should be the rule for seedlings. Annuals require plenty of room when planted out in the garden. Being quick growers, they are generally gross feeders, and they must have space to develop a good root system. Feeding, too, with liquid manure is helpful when they are reaching the flowering stage.

Dahlias may now be planted out, either from tubers or from young rooted cuttings. These will give good early summer blooms. For autumn and show blooms, the planting should be deferred until the middle of December.

Herbaceous and succulent plants should be staked for protection; included in this section are delphinium, gladiolus, perennial phlox, rudbeckia, &c. These plants will all benefit from liberal mulchings and watering with liquid manure when approaching the blooming period. Spring flowering bulbs, corms, and tubers should now be lifted and stored.

The soil surfaces will now benefit from frequent hoeings and stirrings. Constant waterings will be required if the weather be hot or windy, the cultivation should quickly follow the waterings in order that the moisture may be thoroughly conserved. Mulching with stable manure is also beneficial at this season.

REMINDERS FOR DECEMBER.

LIVE STOCK.

Horses.—All farm horses in constant work at this season should be well fed with last year's chaff or a mixture of old and new, to which a liberal supply of oats has been added. New chaff or hay alone is not recommended, as it has

not the sustaining powers of old hay, and is liable to give rise to digestive troubles. Horses require water at frequent intervals; keeping them for a long time without water, and then allowing them to drink to excess is injurious.

An occasional feed of green stuff will be beneficial. In the event of this being unobtainable, give at week-ends a bran mash, to which is added five or six packets of Epsom salts.

Mares which are away from foals for any length of time should have a portion of milk taken from them before foal is allowed to run with them, otherwise serious results may accrue to foal. Good results follow an allowance of chaff and oats to mares and foals running in paddocks, more especially where feed is short.

At this season the Bot Fly is about, and horses should be frequently examined for the eggs of this fly. The neck, forelegs, and jaws are the parts where the eggs are deposited. Either the use of the singeing lamp under affected parts or the application of kerosene will destroy the eggs.

Cattle.—Provide succulent fodder and plenty of clean water and shade. The silo is the cheapest method of providing succulent fodder, silage costs less than 10s. per ton to grow and save. Mow and make hay of as much grass as possible. This will keep indefinitely so long as it is protected from the weather. Mice will not work in it. Limewash the cowbails, it helps to keep down flies. Provide "lick" in trough, consisting of salt 20 lbs., bone meal 20 lbs., and sulphate of iron ½ lb. Look out for milk fever. Read up method of treatment in *Year-Book of Agriculture*, June, 1905. Have cows' milk weighed, and tested for butter fat. Rear heifer calves from cows giving satisfactory results. Continue giving milk at blood heat to calves. Be careful to keep utensils clean, or diarrhœa will result. Do not give too much milk at a time for the same reason. Give half-a-cup of limewater in the milk to each calf. Let them have a good grass run or lucerne, or ½ lb. crushed oats each per day in trough. Dehorn all dairy calves, except those required for stud or show purposes.

Pigs.—*Sows.*—Supply those farrowing with plenty of short bedding in well-ventilated sties. Those with litters old enough may be turned into grass run. *All* pigs should be given a plentiful supply of clean water. Read Bulletin No. 16. Pig raising and fattening with present price of pollard and bacon should be profitable.

Sheep.—Dispose of all faulty-mouthed ewes, inferior-fleeced wethers, and coarse-flock sorts in best condition at any time possible. Those in favoured areas can replace with younger, better, finer-grade sorts. Where ewe lambs are intended to be held for future breeding, see that the cross results in shafty, fine to medium grade fleeces, as well as a shapely frame. Allow rams to remain with the ewes seven weeks, this period admitting of any ewes coming in season the second time. It is rarely necessary to join more than 3 per cent. of 2 tooths, 3 per cent. of 5 and 6 year olds, or 2 per cent. of 2, 3 and 4 year old rams, unless with young ewes. Where conditions justify it, 4 per cent. of vigorous matured rams with aged coarse crossbred ewes will bring a greatly increased number of twin lambs. Clear wool from eyes, and burrs from about the pizzles of rams, and cut hoofs into shape before mating. Ewes should be of one breed, or as near one cross as possible, to insure an even and rapid dropping. Merino and fine cross ewes are in season earliest, first cross or half-breds later, and all ewes with a preponderance of British blood later still. It is useless to join rams with ewes until their proper time of coming in season. Ewes carry their lambs four months, four weeks, four days, or roughly, five months.

Poultry.—Add a little peameal to morning mash and give less bran. Feed equal parts wheat and heavy oats at night. Supply plenty of green food—at this time, lettuce is invaluable. Avoid salt meat of any description. Put Douglas mixture in drinking water when required. Keep ample supplies of sand, ashes, &c., in pens, and moisten same. This will enable the birds to keep themselves cool and clean. Top off geese, ducks, and cockerels for the Christmas markets. Hens will do better this month by having free range. Remove all male birds from flocks, as infertile eggs will keep longer and command a higher price.

BEE-KEEPING.

December is the month for the main honey flow from yellow box and red gum. Swarming is practically over for the season except, perhaps, in late districts. Where there has been more swarming than the owner of the bees desired, and

the total yield of honey is the object aimed at rather than increase in the number of colonies, the weaker stocks may be united at the commencement of the honey flow, as the highest return is secured by having a given number of bees in the fewest possible number of hives; that is to say, 50,000 worker bees in one hive will store a far greater amount of honey than the same number in two hives with 25,000 bees in each. Such a large worker-force requires three bodies of full-depth frames, otherwise the best results cannot be obtained, because nectar being as thin as water when brought in by the bees, only a little is put into each cell to hasten evaporation. When, therefore, sufficient empty combs are not available to the bees, part of the worker-force will be idle.

Each colony should have at least three sets of Langstroth size combs, and when these are not available the time of the red gum honey flow is suitable for getting new combs drawn out from full sheets of foundation. Comb foundation is expensive, but in the end combs built from starters are more expensive still, because so much drone comb is built when starters only are given, that one of the principal advantages of the frame-hive system is lost.

All frames should be wired, four horizontal wires being most in favour with beekeepers; the wires should be well embedded into the foundation so that it may not come away from them. Between the bottom edge of the sheet of foundation and the bottom bar of the frame there should be a space of at least ¼-inch, to allow for the expansion of the sheet by the heat of the hive.

The best combs are obtained when the foundation is drawn out by the bees in the super immediately over the brood nest without an intervening excluder.

Combs should be capped at least two-thirds before being extracted, so that the honey will be of good density. When hives are run three stories high, as indicated above, there is no necessity to extract all the honey at one time; one set of combs can be extracted, and the empty combs returned to the hive, and when they are partly filled again the others can be taken. In this way the bees are not upset so much as when all the combs are wet and sticky after extracting, and the risk of leaving the hive destitute of stores is avoided should the honey flow suddenly cease.

CULTIVATION.

Farm.—Cut hay in late districts. Cut oats and barley in early places. Finish planting potatoes. Put in late maize for fodder, also millet and imphee. Plough fire-breaks where required. Get stackyard and stages ready for hay.

Orchard.—Keep the surface loose and free. Suppress weeds. Spray as often as necessary for codlin moth and pear slug. Mulch and spray young trees and grafts with water in the early morning during hot weather.

Vegetable Garden.—Keep the surface hoed, and allow the plants plenty of moisture. Stake, pinch out, manure, and water tomatoes. Pinch back long runners of pumpkin and melon family. Sow autumn and winter varieties of cabbage and cauliflower. Plant out seedlings in cool weather. Sow French beans. Cease cutting asparagus beds, and top-dress with manure.

Flower Garden.—Plant out dahlias and gladioli for autumn blooming. Lift and store spring flowering bulbs. Stake, tie, and train growing plants. Sow zinnias and asters. Layer carnations, camelias, daphnes, &c. Water well and keep the surface loose. Keep rose beds fairly dry.

Vineyard.—Inspect young grafted vines (field or bench); suckering and removal of scion roots should be carefully attended to—See *Bulletin No.* 38 (Spring Grafting), obtainable on application. Tie up young vines. Beware of cut worms on young vines (information concerning this pest posted on application). Tying up of bearing vines, if practised, should be completed early in month. Avoid excessive and indiscriminate topping, far too frequent in Victoria. Scarify, if soil is not sufficiently loose, and after heavy rain or irrigation. Look out for oidium and repeat sulphurings on first appearance of disease. Further spraying for Downy Mildew will be needed if weather conditions favour the fungus.

Cellar.—Fill up regularly and keep cellars as cool as possible.

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Extract from "Argus," 24/10/22.– **FODDER SHORTAGE LIKELY.** Fearing a shortage of fodder the Water Commission is advising settlers in the irrigation areas, particularly those who specialize in fodder growing, to increase their production as far as possible this year. The shortage is expected throughout Australia owing to dry conditions. The Chairman of the Commission (Mr. Cattanach) said yesterday that, apart from increased returns, he thought that settlers by increasing their acreage would be performing a national service. The Commission had already circularized its officers to this effect, and every effort would be made to induce growers to provide reserves of fodder.

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G.G. Sire's D. Dam's	,,	12565 ,,	...	10 ,, ,,	8853 ,,
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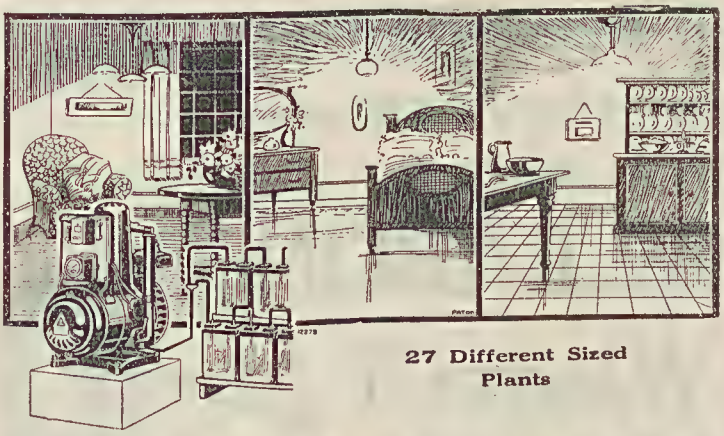

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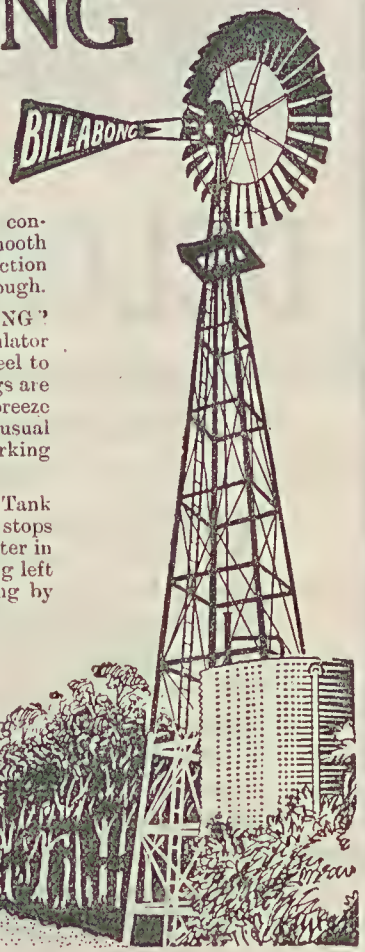

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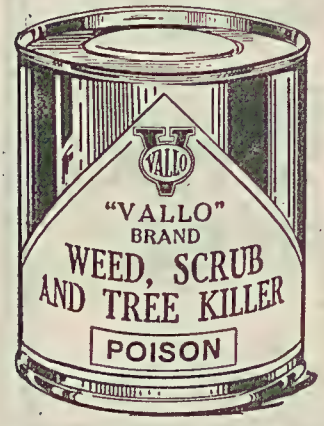

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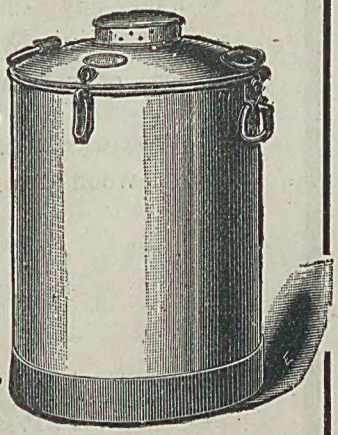

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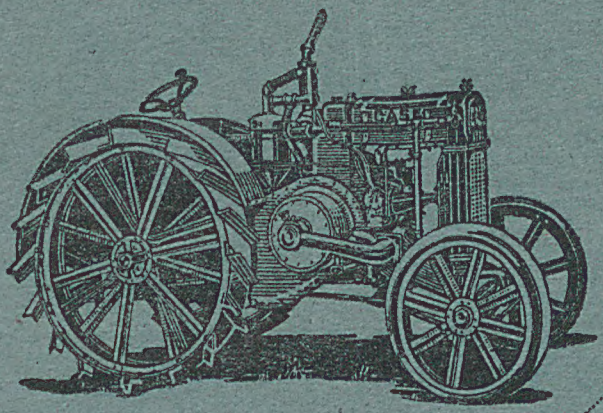

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